

Arctic
Insects

A SURVEY OF THE INSECTS
AND RELATED ARTHROPODS
OF ARCTIC ALASKA

Part I

BY
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A SURVEY OF THE INSECTS AND RELATED ARTHROPODS OF ARCTIC ALASKA¹

PART I

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(Plates IV-X)

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INTRODUCTION

The Arctic has generally been considered to have a depauperate insect fauna. This view is not surprising when it is recalled that insects are poikilothermic animals, animals with a variable temperature depending on the environment. The land vertebrates in this category, such as reptiles and amphibians, are notoriously sluggish in cool temperatures and the cold Arctic climate might seem to be as unfavorable for insects as for these larger animals.

Historically this view has been upheld by the early travellers in the American Arctic, who have collected or reported few insects. Indeed, the report of one of the first expeditions in the Alaskan Arctic to bring back a collection of insects, the United States Polar Expedition of 1881–83, states (1885, p. 133): "The shortness of the summer season rendered the collecting of insects difficult and unsatisfactory. . . ." Sgt. Murdock recorded 16 genera of insects and a spider from this expedition. Prior to this expedition the others in the Canadian Arctic had recorded a few scattered insects but with such incomplete locality and other data as to be largely valueless.

The Canadian Arctic Expedition of 1913–18 was the first American expedition to make any real gesture in elucidating the insect fauna and this expedition is also valuable for including a few Alaskan Arctic records, with which this discussion is especially concerned. Since the days of the Canadian Arctic Expedition, and especially during the 1940's, a large amount of material has been collected in the Canadian Arctic which is being currently studied.

The insect fauna of Greenland has become much better known through the Meddelelser om Groenland series and several hundred species have now been reported.

A brief reconnaissance in 1948 in that part of Alaska from the Brooks Range north to the Arctic Coast, hereafter referred to as the Alaskan Arctic, resulted in 102 insects and their relatives becoming known (Weber, 1948b, 1949).

In the present account "insects" will also include the related arthropods such as myriapods, spiders and mites which are generally treated with them. The term "Arctic" is taken to mean that part of North America lying beyond the boundary of coniferous trees. In Alaska that would include the coast bordering the Bering Sea and the Arctic Sea Coast south to the crest of the Brooks Range, as well as the higher parts of other Alaskan mountains such as the Alaskan Range.

ORIGIN OF ARCTIC INSECTS

Geological evidence points to connections at several times between Arctic Alaska and Siberia on the one hand and between Arctic North America, Greenland and Europe on the other hand. During the Eocene and Miocene, among the times when such connections were probable, insects were well developed. There was probably a holarctic insect fauna of modern facies in the Eocene, proliferating greatly in the warm Oligocene and the changing climate of the Miocene, only to become restricted in the Pliocene and during the glaciation of the Pleistocene. The view has been advanced that in Greenland the summits of mountains or hills (nunataks) remained essentially free during the Pleistocene glaciation (Hammer, 1944) and areas in the American Arctic are also believed to have been unglaciated so that the hardier insects could well have survived. Since the insects now present in northern areas are able to withstand extremely low temperatures it is probable that many could withstand Pleistocene temperatures. The governing factor then was probably the one always basic, distribution of plants on which animals directly or indirectly depend. Where plants were left exposed and survived, then insects probably survived with them. Such plants as lichens, fungi and mosses which are now so hardy, could have served as food for mites and Collembola at least.

Assuming that many species of insects did not survive in the Arctic during the heights of the Pleistocene glaciation, it is quite possible that they have migrated back several times during the warm interglacial periods and that we are today in such a period when the climate is becoming warmer.

The Arctic insect fauna as it now exists thus may have a double origin, one part consisting of hardy insects which are the remains of a continuous holarctic fauna, and the other part consisting of more recent migrants.

The Brooks Range

The rise of the Brooks Range, however, has created a barrier to this free movement of animal faunas. It has likely been a barrier since the close of the Cretaceous but sufficient time has elapsed for the fauna to arrive north of the mountains from the south at various warm times while there have been other opportunities from the west and east. During cold periods, the mountains may have been a real obstacle by creating a cold, sterile and rugged barrier. The last glacial period has perhaps thus made possible the last isolating factor of this type.

The Brooks Range at the present time does not appear as a substantial barrier. The broad Anaktuvuk Pass with an elevation above the sea of less than 2200 feet permits continuous movement of insects. The fact that butterflies, mosquitoes, staphylinid beetles, Collembola, mites, spiders and other arthropods were taken at 4000 feet at the margin of the pass in 1949 indicates their ability to move through the Range at any other place where plant growth is suitable, which is known to be the case at comparable and higher elevations generally. Whether the insect is winged or not makes little difference, time permitting, and Braendegaard (1946, p. 81) makes much of the motility of "aeronautical" spiders in Greenland.

Migratory Routes

Aside from direct passage through the Brooks Range, entirely feasible for Collembola, mites, spiders, and other arthropods, the eastern and western borders of this range offer direct connection from the south. The Mackenzie River taps the forested areas to the south and shore currents carrying driftwood conceivably could

bring some insects to the Alaskan shores. These shore currents carrying driftwood could also carry Siberian insects here. That this is not pure speculation is indicated by the actual records of Collembola and mites in driftwood on the open Alaskan beach.

NATURE OF THE FAUNA

The preponderance of certain insect groups has been noted (Weber, 1948b). The great majority of the readily visible insects are Diptera or flies of which the notorious mosquitoes and midges are the most numerous. The insect surveys of Greenland showed species of Diptera similarly numerous and one may infer that individuals of this type may also greatly outnumber all other insects here. The situation in the Canadian Arctic is probably similar though not emphasized in the 1913-18 expedition reports.

The abundance of Diptera contrasts with that in tropical areas where the social ants and termites are generally considered to be the most numerous of what might be called the macroscopic fauna. While Diptera are ubiquitous, the insect fauna is so much more diverse that their numbers are only locally impressive, as a swarm of mosquitoes.

Collembola and mites make up the bulk of what might be termed the microscopic fauna.

ACKNOWLEDGMENTS

A study of any insect fauna is impossible without the cooperation of many specialists and the following have rendered indispensable assistance by supplying determinations:

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RELATIONS OF INSECTS WITH PLANTS

Insects and plants are interdependent in the Arctic as elsewhere but the emphasis may differ in the relationships.

The prevailing low stature of the plants on the tundra generally is favorable to the development of the terrestrial or hypogeic Collembola and mite fauna. These are primary feeders on fungi and their spores, and on plant tissue in general. They secure shelter under lichens and mosses and among the roots of higher plants. The high relative humidity at the surface enables these arthropods to move about freely without danger of desiccation. Collembola may be found feeding directly on the pileus of Basidiomycetes and upon other fungi. They and mites are universal and important agents in converting the vegetation to animal food. Collembola and mites are preyed upon by staphylinid and carabid beetles, by spiders and by other arthropods which in turn are preyed upon by vertebrate animals such as birds and mammals.

Heteropterous and homopterous plant-sucking insects are present but not conspicuous. Coccids on the roots of *Salix* and other plants and aphids on the leaves and stems of plants are found sparingly, as are gall insects. Lepidopterous caterpillars feed on the vegetation as is customary but aggregations have not been seen. Tenthredinids (sawflies) are not uncommon but several of the wood-boring families of Coleoptera are unknown. Although *Salix*

may develop into a large bush there is evidently not sufficient continuous woody growth on the tundra generally to support most of the wood-boring insects. This is also true of the common wood ant (*Camponotus herculeanus*) which barely enters the area at Anaktuvuk Pass.

Pollination of the flowering plants appears to be accomplished in large part by flies and bumblebees. Mosquitoes have been found to carry the pollinia of ground orchids in sub-arctic Canada and may have related roles farther north. Midges and other small flies are constantly to be found in flowers, and the buzzing of bumblebees as they make their rounds is one of the few sounds of the tundra.

RELATIONS OF INSECTS WITH FISHES

Insects are the most important food for fresh-water fishes like the Arctic grayling and Whitefish. Their stomachs may literally be distended with these. Caddis worms, the young of Trichoptera, in their pebbly or woody cases, are an important component as are the nymphs of stone flies (Plecoptera). Adults of all insects are taken as they are blown or tumble into the water. Carabid beetles, curiously enough, are commonly found in fish stomachs. The beetles in their search of prey must venture out on grass blades over the water or forage at the water's edge where they are snapped up by the fish. Another unexpected component of the fish diet are snails of which a number of species have been reported (Weber, 1949).

RELATIONS OF INSECTS WITH BIRDS

While birds may be the chief insect-eaters, aside from other arthropods, of more temperate regions, they do not play a similar role in the Arctic. Ducks and shore birds, however, doubtless feed on aquatic insects and some of the land birds may be in part insectivorous. The insectivorous warblers were not noticed and most of the smaller land birds appear to be the seed-eating fringillids.

RELATIONS OF INSECTS WITH MAMMALS

One of the most significant relations insects have with mammals is perhaps that with lemmings (Weber, 1949, 1950). As the most

numerous and widespread mammal of the tundra, they are everywhere involved with insects. Their nests, in which they live most of the year under the snow, have been found to harbor as many as 5,000 arthropods per nest. These are chiefly mites, Collembola and the larvae of the midge fly, *Spaniotoma*. The nests create a favorable environment as dry and sheltered sites while in addition the feces and discarded food of the lemmings serve as food for the insects.

A more spectacular relationship is that with caribou. The botfly, *Oedamagena tarandi*, may infest the animal in such numbers as to render the hide of little value to the Eskimo.

The ectoparasites such as mites, lice and ticks do not occur in such variety as in the tropics, where five species of ticks may occur on one animal (Weber, 1948a). The cold climate must render the transfer of parasites from one animal to another more difficult. The absence of ticks and fleas on Eskimo dogs has been mentioned. Tethering the dogs separately hinders transfer of them. Lice are not known from caribou according to Ferris (in conversation).

Like *Citellus* species in the United States, *Citellus parryi* subspecies of the Alaskan tundra probably feed regularly on insects though depending mostly on vegetation. Mice also doubtless feed on insects.

In addition to the botflies above, blowflies are regularly associated with the carcasses of mammals and hundreds have been taken on one lemming carcass.

THE INSECTS AND THEIR ALLIES

The insects and their allies, known up to the present from Arctic Alaska, are listed below by orders beginning with the related arthropods: spiders, mites and centipedes.

The following lists will be extended as more determinations become available from specialists and this is particularly true of Diptera which contains a number of Arctic species of particular difficulty.

The specific identifications of many are unsatisfactory because of the impossibility of comparing Eurasian type material with American material of close relationship, which may be even conspecific. These, of course, are difficulties inherent in the study of any large faunal area.

Essentially the lists consist of two sets of records from Arctic Alaska, those from the Canadian Arctic Expedition of 1913-1918, abbreviated as (C. A. E.) after the species records, and those of my 1948 and 1949 collecting, abbreviated as (N. A. W.). A few other records are listed more fully including those from Greenland by M. Hammer, abbreviated as (M. H.). Canadian Arctic records are included when the species is known from Arctic Alaska.

The United States National Museum will be the repository for the most complete set of specimens collected in Arctic Alaska by the author. The identifications have been made by many specialists and several have exercised their privilege of retaining specimens; this includes several specimens not represented in the National Museum set because of scarcity of material. Duplicate specimens will be deposited in the Canadian National Museum, Ottawa, Museum of Comparative Zoology, Cambridge, Mass., Academy of Natural Sciences of Philadelphia and American Museum of Natural History, New York.

The following insects were recorded by the United States Polar Expedition of 1881-83 from Pt. Barrow and are historically valuable although the names and classification may differ from those now in use:

NEUROPTERA (TRICHOPTERA).—*Leptocerus* sp., *Oligopteryx morosum*?

COLEOPTERA.—*Amara obtusa*, *Chrysomela montivagans*.

DIPTERA.—*Scatophaga* sp., *Cordylura* sp., *Chironomus* spp., *Anthomyia* spp., *Ctenophora* spp., *Oedemagena tarandi*, *Urocera flavicornis* and a tachinid fly.

LEPIDOPTERA.—*Larja rossii* and an Arctian moth.

HYMENOPTERA.—*Bombus moderatus*, *Bombus sylvicola*.

"A species of Podurid and a spider were also turned over to Professor Riley". The *Scatophaga*, "probably undescribed", were swarming around the bodies of dead Eskimos and may be what is recorded below as *Scopeuma vulpinum* or another species in the list. *Chironomus* of three species were abundant at all tundra pools and had aquatic larvae. They may have included the *Spaniotoma* listed below. The *Larja* emerged from a cocoon in the house. While the author of the report is Lt. P. H. Ray, the

collector appeared to be Sgt. John Murdock of the Signal Corps, and it was the well-known Professor C. V. Riley who identified the specimens. They should be in the U. S. National Museum collection.

ARACHNIDA—Order ARANEAE

(Spiders)

Spiders are common tundra animals, capable of moving about at freezing temperatures. They are generally predatory and scurry over the ground. In the mountains of the Brooks Range they ascend to heights of over 4,000 feet where they form webs to trap mosquitoes, butterflies and moths and other winged insects. They also prey on the wingless forms on the tundra. The species are widely distributed because of their hardiness and widespread food. It is probable that several summers are needed to mature the species so that at any one time mostly immatures, difficult of identification, will be found.

LYCOSIDAE

Pardosa tesquorum Odenwall.—Alaska: Anaktuvuk, 1948; Umiat, Colville R., July 3, 1949, 2 males, 1 female, 7 im., running freely on dryish tundra on top of valley; 3 males, egg sacs, top of Mt. Umiat; 1 female, attacking live fly, 1 female, egg sac, Anaktuvuk Pass (68° 20' N.), July 8, 1949, open tundra; 1 female, egg sac, Anaktuvuk Pass (151° 30' W.), July 9, 1949, sand dune along river. (N. A. W.)

Pardosa varians Gertsch.—Alaska: Anaktuvuk Pass, 1948, 1 female, egg sac (68° 20' N.) sand dunes along river, July 9, 1949; 1 female, egg sac (151° 30' W.) open tundra, July 6, 1949; 1 female, egg sac, foraging at 3200 feet, July 5, 1949; 1 female, egg sac, open tundra, July 23, 1949. (N. A. W.) Known from northwestern Canada.

Pardosa undescribed sp.—1 female, Anaktuvuk Pass 4000 feet, July 7, 1949. (N. A. W.)

Pardosa lapponica Thorell?—Anaktuvuk, 1948. A European species. (N. A. W.)

Pardosa tristis Thorell.—Anaktuvuk, 1948. Known from the Rocky Mountains. (N. A. W.)

Pardosa glacialis Thorell.—Umiat, Colville R., 1 male, July 11, 1949, summit of Mt. Umiat. (N. A. W.)

Pardosa concinna Thorell.—Umiat, Colville R., 1 male, July 2, 1949, river bottom. (N. A. W.)

Pardosa sp. ? *groenlandica* group.—Anaktuvuk Pass, 2 females; 1 im., July 7, 1949, foraging at 3200 feet. (N. A. W.)

Tarentula sp. ?.—Umiat, Colville R., 1 female with egg case, July 3, 1949, elevation 850 feet, slope of Mt. Umiat. (N. A. W.)

Tarentula pictilis Emerton.—Umiat, Colville R., 1 male, 1 female, 1 im., July 3, 1949, driest part of tundra on top of valley; 1 penultimate male, top of Umiat Mt. 950 feet. (N. A. W.)

Tarentula hamiltoni Chamberlin and Ivie.—Anaktuvuk Pass, 1 female, egg sac, July 9, 1949, large spiders, each with egg case, under small stones on valley tundra. (N. A. W.)

Arctosa alpigena Doseschall.—Umiat, Colville R., 1 im., July 25, 1949, lemming runways. (N. A. W.)

ARGIOPIDAE

Aranea sericata Clerck.—Anaktuvuk, 1948, two spiders in neat cocoon with dead leaves attached. A European and Siberian species. (N. A. W.)

Tetragnatha extensa Linnaeus.—Anaktuvuk, 1948. A European and Siberian species.

Tetragnatha laboriosa Hentz.—Anaktuvuk Pass, 1 female, July 23, 1949, meadow beside lake. (N. A. W.)

Epeira sericata Clerck.—Alaska (68° 20' N., 151° 30' W.), 1 female, July 25, 1948, under *Salix* (N. A. W.); 1 subadult male (69° 50' N., 156° W.), July 16, 1949, open tundra. (N. A. W.)

Aculepeira aculeata Emerton.—Anaktuvuk Pass, 3500 feet (68° 20' N., 151° 30' W.), July 22, 1949, 1 female and 1 immature female spider with orb web on jagged mountain slope. (N. A. W.)

Aculepeira sp., undescribed.—Anaktuvuk Pass (68° 20' N., 151° 30' W.), July 7, 1949, 1 female 1 pen. male 1 im. female, 3150 feet, with orb web, with fresh-caught male *Aedes*; 1 pen. male, 2650 feet, orb web. (N. A. W.)

CLUBIONIDAE

Micaria sp., undescribed.—McKinley Park, Station, August 4, 1949, 1 female. (N. A. W.)

Clubiona sp., undescribed.—Anaktuvuk Pass (68° 20' N., 151° 30' W.), July 23, 1949, 1 female, tundra along river. (N. A. W.)

DICTYNIDAE

Dictyna sp.—Anaktuvuk, 1948. (N. A. W.)

GNAPHOSIDAE

Gnaphosa orites Chamberlin.—Umiat (Per Scholander), 1948. A European and probably Siberian species. (N. A. W.)

Gnaphosa muscorum L. Koch.—Umiat, Colville River, July 3, 1949, 1 female 1 im. male, top of valley, running on dryish tundra; 1 female, 750 feet, large spider feeding on smaller (male?). (N. A. W.)

HAHNIIDAE

Hahnia glacialis Soerensen.—Anaktuvuk Pass (68° 20' N., 151° 30' W.), July 5, 1949, 1 male, 1 female, 4 juv., foraging at 3200 feet. (N. A. W.)

LINYPHIIDAE

Coryphaeolana sp.—Pt. Barrow, 1948. (N. A. W.)

Hilaira curvitaris Sorensen.—Pt. Barrow, 1948, common on tundra. Known from northern Canada and Greenland. (N. A. W.)

"*Erigone*" *chilkatensis* Chamberlin and Ivie?—Anaktuvuk, 1948, under small rocks with south exposure on island in river bed. (N. A. W.)

Erigone sibirica Kulczynski?—Anaktuvuk, 1948. A Siberian and European species. (N. A. W.)

Erigone psychrophila Thorell.—Pt. Barrow, 1948, among grass and herbs on tundra. (N. A. W.)

"*Erigone*" sp. A.—Pt. Barrow, 1948. Crawling slowly on hillock of tundra which had a surface temperature of 36°, with patches of snow in vicinity. (N. A. W.)

"*Erigone*" sp. B.—Anaktuvuk, 1948. Under small rocks with south exposure on island in river bed. (N. A. W.)

THOMISIDAE

Xysticus labradoriensis Keyserling.—Umiat, Colville River, July 11, 1949, 1 male, 950 feet on Umiat Mt. (N. A. W.)

ARACHNIDA—Order ACARINA

(Mites and Ticks)

No ticks are recorded from Arctic Alaska or Canada and this is hardly surprising in view of their generally tropical nature, Africa being the home of the majority.

Mites, on the other hand, are exceedingly widespread and abundant in all parts of the Arctic where tundra exists, perhaps being scarce or absent from the Greenland ice-cap.

Two species are listed by the Canadian Arctic Expedition from Arctic Alaska. The determinations of the 1948 specimens arrived too late to be included in the 1949 report (Weber, 1949) but amounted to 19 unidentified species which were sent to Denmark for additional study. Thousands of specimens were taken in 1949.

Of 37 genera listed by Hammer from Greenland, eight were taken on the 1948 work.

In view of the difficulty of securing any but generic identifications for mites, where a genus has been identified from Arctic Alaska, the Greenland and other distribution of the known species are added. Some of these species will likely be identified from Alaska in the future.

In addition to the collector's initials (C. A. E.) and (N. A. W.), the new initials (M. H.) refer to Marie Hammer as collector and as published reference.

RHAGIDIIDAE

Rhagidia gelida Thorell.—Canada: Bernard Harbour, Dolphin and Union strait, Northwest Terr., August 16, June 19, 1915, in rotten driftwood and under stones. (C. A. E.)

Rhagidia sp.—Alaska: Point Barrow, August 22, 1948. (N. A. W.)

HYPOTHONIIDAE

Brachythionius berlesi Willm.—East Greenland, Sweden, Germany, Italy, North America. (M. H.)

Brachythionius zelawaiensis Selln.—East Greenland, Sweden, Germany, North America. (M. H.)

Brachythionius brevis Mich.—East and west Greenland, Spitsbergen, Lapland, Scotland, England, Ireland, Denmark, Germany, Switzerland, Italy. (M. H.)

Brachythionius sellnicki Thor.—East Greenland, Spitsbergen. (M. H.)

Brachythionius grandis Sell.—West Greenland. (M. H.)

Brachythionius sp.—Alaska: Anaktuvuk Pass, July 7, 9, 1949; Umiat Mt., July 11, 1949, at 900 feet. (N. A. W.)

CAMISIIDAE

Nothrus borussicus Sell.—East and west Greenland, Iceland, Germany, Austria. (M. H.)

Nothrus bicilatus C. L. Koch.—Iceland. (M. H.)

Nothrus silvestris Nic.—Iceland (M. H.)

Nothrus sp.—Alaska: Anaktuvuk Pass, August 30, 1948; Point Barrow, August 22, 1948, from lemming runways. (N. A. W.)

TYDEIDAE

Tydeus sp.—Alaska: Point Barrow, August 22, 1948, from tundra, turf ground and lemming runways. (N. A. W.)

ZERCONIDAE

Zercon sp.—Alaska: Point Barrow, August 22, 1948, from turfy ground and lemming runways. (N. A. W.)

HERMANIIDAE

Hermannia reticulata Thor.—East and west Greenland, Jan Mayen, Bear Island, Spitsbergen, Novaja Semlja, The Faroes, England, Ireland, Denmark, Holland, France, Italy. (M. H.)

Hermannia scabra L. Koch.—West Greenland, Iceland, Bear Island, Novaja Semlja, Arctic Siberia. (M. H.) Alaska: Pt. Barrow, August 22, 1948, from tundra surface and from turfy soil and debris of lemming runways. (N. A. W.) "Not thus far identified from Canada" (Hammer).

Hermannia sp.—Alaska: Anaktuvuk Pass, August 30, 1949; Point Barrow, August 22, 1948. (N. A. W.)

ERYTHRAEIDAE

Leptus sp.—Alaska: Umiat Mt., June 11, 1948, attacking a weevil (*Apion* sp.) (N. A. W.)

ORIBATULIDAE

Zygoribatula sp.—Alaska: Anaktuvuk Pass, August 30, 1948. (N. A. W.)

Zygoribatula exilis (Nic.) (*Oribatula exilis*).—Alaska: Anaktuvuk, August 30, 1948, from tundra surface at base of dwarf *Salix*. (N. A. W.)

BDELLIDAE

Bdella arctica Thorell.—Canada: Young Point, July 22, 1916, on rocks on beach; Bernard harbour, Northwest Terr., August 23, 1915, under stones at beach. (C. A. E.)

Bdella frigida Banks.—Canada: Herschel Island, Yukon Terr., July 28, 1916, on ground. (C. A. E.)

Bdella decipiens Thorell.—Canada: Bernard Harbour, Northwest Terr., May 18, 1915, under stones. (C. A. E.)

Bdella sp.—Alaska: Anaktuvuk Pass, August 30, 1948. (N. A. W.)

CERATOZETIDAE

Ceratoppia bipilis Herm. var. *sphaerica* L. Koch.—Greenland, Spitsbergen, Canada and North America, Lapland, northern Russia, Arctic Siberia. (M. H.)

Ceratoppia sp.—Alaska: Anaktuvuk, August 30; Point Barrow, August 22, 1948. (N. A. W.)

Trichoribates trimaculatus C. L. Koch.—East and west Greenland, Iceland, Spitsbergen, Lapland, Arctic Siberia, Switzerland. (M. H.)

Trichoribates incisellus Kramer.—East and west Greenland, Iceland, Spitsbergen. (M. H.)

Trichoribates setiger Trgdh.—Iceland. (M. H.)

Trichoribates monticola Trgdh.—Iceland. (M. H.)

Trichoribates novus Sell.—Iceland. (M. H.)

Trichoribates sp.—Alaska: Point Barrow, August 23, 1948, turfy ground and lemming runways. (N. A. W.)

Trichoribates sp.—East and west Greenland. (M. H.)

BELBIDAE (= Eremaeidae)

Eremaeus oblongus C. L. Koch.—North America, west Greenland, Iceland, Lapland. (M. H.)

Eremaeus sp.—Alaska: Anaktuvuk Mt., July 7, at 3950 feet; Anaktuvuk valley floor, July 9; Umiat Mt., July 11, 1949, at 915 feet. (N. A. W.)

Oppia translamellata Willm.—East and west Greenland, Iceland, Spitsbergen, Lapland, Sweden, Germany. (M. H.) Alaska: Anaktuvuk, August 30, 1948, from tundra surface at base of dwarf *Salix*; 3950 feet on mt., July 7, 1949, under lichens, mosses and higher plants; Umiat, July 11, 1949, south exposure of 900-foot bluff. (N. A. W.)

Oppia unicarinata Paoli.—Iceland. (M. H.)

Oppia bicarinata Paoli.—Iceland. (M. H.)

Oppia ornata Oudms.—East and west Greenland, Iceland, Spitsbergen, Sweden, Denmark, Germany, Austria. (M. H.)

Oppia fallax Paoli.—Spitsbergen. (M. H.)

Oppia fallax v. *obsoleta* Paoli.—Iceland. (M. H.)

Oppia falcata Paoli.—Iceland. (M. H.)

Oppia maritima Willm.—East Greenland, Germany. (M. H.)

Oppia splendens C. L. Koch.—Iceland, England, Ireland, Germany, Switzerland, Italy, North Africa, North America, Hawaii. (M. H.)

Oppia nitens C. L. Koch.—Iceland. (M. H.)

Oppia subpectinata Oudms.—Iceland. (M. H.)

Oppia quadricarinata Mich.—East and west Greenland, Iceland, England, Germany, Switzerland, Italy, North America. (M. H.)

Oppia neerlandica Oudms.—East and west Greenland, Iceland, Spitsbergen, Lapland, Sweden, Germany, North America.

Oppia sp.—Alaska: Anaktuvuk Pass, August 30, 1948. (N. A. W.)

Oppia sp.—Alaska: Anaktuvuk Mt., July 7, at 3950 feet; Anaktuvuk valley floor, July 9; Umiat Mt., July 11, 1949, at 915 feet. (N. A. W.)

Belba gracilipes Kulcz.—West Greenland. (M. H.)

Belba tenuipes Mich.—West Greenland. (M. H.)

Belba clavipes Herm.—Iceland. (M. H.)

Belba compta Kulcz.—Iceland. (M. H.)

Belba tatricea Kulcz.—West Greenland. (M. H.)

Belba tecticola Mich.—Iceland. (M. H.)

Belba ursina Thor.—Spitsbergen. (M. H.)

Belba trügardhi Gräverson.—West Greenland. (M. H.)

Belba sp.—Alaska: Anaktuvuk Mt., July 7, 1949, at 3950 feet, from humus about lichens, mosses, and higher plants on fully exposed jagged rocks facing the pass. (N. A. W.)

Belba sp.—East Greenland. (M. H.)

TETRANYCHIDAE

Bryobia praetiosa Koch.—Canada: Bernard Harbour, Northwest Terr., July 19, 1915, on dead *Salix* leaves; October 4, 1914, under stones. (C. A. E.)

Bryobia sp.—Alaska: Point Barrow, August 22, 1948, turf ground and lemming runways. (N. A. W.)

GAMASOLAEALPTIDAE

Gen. et sp.—Alaska: Anaktuvuk Pass, August 30, 1948. (N. A. W.)

EUPODIDAE

Eupodes sp.—Alaska: Point Barrow, August 22, 1948, turf ground and lemming runways. (N. A. W.)

Platynothrurus sp.—Alaska: Pt. Barrow, August 22, 1948, debris of lemming runways; Anaktuvuk, August 30, 1948, tundra surface at base of dwarf *Salix*. (N. A. W.)

Notaspis sp.—Alaska: Umiat Mt., 900 feet, July 11, 1949, south exposure of bluff. (N. A. W.)

CHILOPODA

(Centipedes)

Centipedes are more commonly associated with warm, dry localities but two species are recorded by the Canadian Arctic Expedition from Arctic Alaska (Nome and Teller). Three species were taken in 1948 at Anaktuvuk Pass, including a new genus, and many specimens were taken in 1949 which have not yet been identified. These animals appear to prefer well-drained sites with considerable exposure and may be found under stones with very little organic matter in the rubble of talus slopes. They are predatory and could readily find mites and Collembola over the whole Arctic slope were they not less tolerant of cold, damp sites.

CHILENOPHILIDAE

Cryophilus alaskanus Chamberlin.—Alaska: Nome, August, 1916. (C. A. E.)

LITHOBIIDAE

Arebius integrator Chamberlin.—Alaska: Anaktuvuk Pass, August 26, 1948, tundra margin of river. (N. A. W.)

Escimobius cryophilus Chamberlin.—Alaska: Anaktuvuk Pass, August 30, 1948, valley tundra. (N. A. W.)

Ezembius stejneri (Bollman).—Alaska: Teller, July 31, 1913; believed widespread in this general region and to occur on the Pribilofs. (C. A. E.)

SCHENDYLIDAE

Escaryus paucipes Chamberlin.—Alaska: Anaktuvuk Pass, August 30, 1948, valley tundra. (N. A. W.)

INSECTA**Order COLLEMBOLA**

The importance of Collembola or springtails has been previously noted. They are common and widespread animals of the tundra. The Canadian Arctic Expedition listed four species from Arctic Alaska and a total of 10 from Canada. Thirty-six species are listed from Greenland, including 13 species also occurring in Arctic Alaska. From the 1948 and 1949 field work 34 species have already been determined with more material yet to be worked on. Twenty-two of these were taken from lemming nests and runways.

In addition to the collector's initials (C. A. E.) and (N. A. W.) the new initials (M. H.) refer to Marie Hammer as collector and as published reference.

ANURIDAE

Anurida granaria Nicolet.—Greenland: Upernavik, S. E. coast, Scoresby-sound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

Anurida undescribed species 1.—Arctic Alaska: Umiat, July 4, 1949, tundra of valley floor (N. A. W.); Fish Creek; lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on wind-swept tundra. (N. A. W.)

Anurida undescribed species 2.—Arctic Alaska: Oumalik, lat. 69° 50' N., long. 156° 00' W., July 16, 1949, tundra on bluff of lake; Pt. Barrow, July 13, 1949, census of lemming nest (*Dicrostonyx rubricatus*). (N. A. W.)

BRACHYSTOMELLIDAE

Brachystomella parvula Schaffer.—Arctic Alaska: Oumalik, lat. 69° 50' N., 156° 00' W., July 15–16, 1949, tundra on bluff of lake. (N. A. W.)

A cosmopolitan species, living "concealed in the damp soil of various fields, and only rarely appears on the surface of the ground in moist terrains. . . ." (Stach). It may also occur on sea-shores.

Willemia anophthalma Börner.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Kangerdlugssuaq, Scoresbysund, Franz Joseph Fjord, N. E. coast, 1931–39. (M. H.)

Willemia similis Mills.—Arctic Alaska: Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on windswept tundra. (N. A. W.) Known from Iowa and Kansas.

ENTOMOBRYIDAE

Entomobrya comparata Folsom.—Arctic Alaska: Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on windswept tundra (N. A. W.); Demarcation Pt., May 16, 1915, driftwood on tundra. (C. A. E.) Arctic Canada: Bernard Harbour, N. W. Terr., May, 1915, under loose stones. (C. A. E.)

Lepidocyrtus cymeus Tullberg.—Arctic Alaska: Demarcation Pt., May 16, 1914, under driftwood on high, dry tundra. (C. A. E.) Greenland: Godthaab-Julianehaab region, 1931–39. (M. H.)

This species also found in Siberia, N.E. Africa, and Bismark Archipelago.

Lepidocyrtus lanuginosus Omelin.—Greenland: Franz Joseph Fjord Region, 1931–39. (M. H.)

Lepidocyrtus sp., undescribed.—Arctic Alaska: Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15–16, 1949, tundra on bluff of lake. (N. A. W.)

Tomocerus flavescens Tullberg.—Arctic Alaska: Umiat, July 4, 1949, tundra composed of mostly *Eriophorum*. (N. A. W.); Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15–16, 1949, tundra on bluff of lake. (N. A. W.); Anaktuvuk Pass, July 6, 1949, humus at base of *Salix*. (N. A. W.)

HYPOGASTRURIDAE

Ceratophysella armatus Nicolet.—Arctic Alaska: Anaktuvuk Pass, July 6, 1949, humus at base of *Salix*; Pt. Barrow, July 13, 28, 30, 1949, lemming nests and runways (*Dicrostonyx rubricatus*) on tundra; Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15–16, 1949, tundra on bluff of lake. (N. A. W.); Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Scoresbysund, Kangerdlugssuaq, Franz Joseph Fjord, N. E. coast, 1931–39. (M. H.)

A cosmopolitan species found to 2800 m. in the Swiss Alps and sometimes found in snow fields but not considered by Stach to be a "proper snow species."

Hypogastrura manubrialis Agren.—Arctic Alaska: Pt. Barrow, June 30, 1949, lemming runways on tundra. (N. A. W.); Greenland: Franz Joseph Fjord region, N. E. coast, 1931-39. (M. H.)

Hypogastrura purpurascens Lubbock.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, Scoresbysound, Franz Joseph Fjord, N. E. Coast, 1931-39. (M. H.) Probably cosmopolitan.

Hypogastrura sensilis Folsom.—Arctic Alaska: Pt. Barrow, June 28, 1949, July 13, 1949, lemming nests (*Dicrostonyx rubricatus*) on tundra. (N. A. W.)

Hypogastrura tullbergi Schaffer.—Greenland: Thule region, Franz Joseph Fjord region, 1931-39. (M. H.)

Hypogastrura viatica Tullberg.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Scoresbysound, Franz Joseph Fjord, 1931-39. (M. H.)

Schaefferia sp., undescribed.—Arctic Alaska: Pt. Barrow, June 30, 1949, lemming runways on tundra. (N. A. W.)

ISOTOMIDAE

Folsomia diplophthalma Axelson.—Greenland: Thule Region, Upernavik, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

Folsomia fimetaria Linné.—Arctic Alaska: Pt. Barrow, June 30, 1949, lemming runways on tundra; Anaktuvuk Pass, July 6, 1949, humus at base of *Salix*. (N. A. W.); Greenland: Upernavik, Disco Fjord, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. corner, 1931-39. (M. H.)

This is a blind species, sometimes taken with *F. quadrioculata* but much less abundantly. It also occurs in north and central Europe. Stach took it in Poland under stones, in forest litter and moss as well as above timberline in moss and lichens.

Folsomia quadrioculata Tullberg.—Arctic Alaska: Umiat, July 4, 1949, tundra, mostly of *Eriophorum*; Anaktuvuk Pass, July 7, 1949, humus at base of *Salix*; Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on windswept tundra; Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15-16, 1949, tundra on bluff of lake. (N. A. W.) Arctic Canada: Arnprior, Ontario; October, 1917. Bernard Harbour, N. W. Territories, June 18, 1915, July 9, 1915. (C. A. E.) Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

This species is also found in Minnesota, Nova Zembla, Spitzbergen, White Island, Bear Island, Poland, Ukrainia, Bulgaria, Yugoslavia and is Holarctic generally. Stach took it commonly about human settlements and on mountain summits. He took it up to 2300 m. in Poland and it has been reported up to 2700 m. in the Swiss Alps. It occurs abundantly in forest litter and moss.

Folsomia sexoculata Tullberg.—Arctic Alaska: Pt. Barrow, June 30, 1949, lemming runways on tundra. (N. A. W.); Greenland: Disco Fjord, Godthaab-Julianehaab, S. E. coast, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.) This species is also found in Spitsbergen, 1921. (S. & S.), and in Finland, Scandinavia, Jan Mayen and North Germany (Stach).

Guthriella sp., undescribed.—Arctic Alaska: Pt. Barrow, June 28, 1949, lemming nest (*Dicrostonyx rubricatus*) on tundra. (N. A. W.)

Isotoma arborea Linné.—Greenland: Kangerdlugssuaq, 1931-39. (M. H.)

Isotoma bipunctata Axelson.—Greenland: Upernavik, Disco Fjord, S. E. coast, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

Isotoma cinerea Nicolet.—Greenland: Scoresbysound, 1931-39. (M. H.)

Isotoma coruleo-griseus Hammer.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, 1931-39. (M. H.)

Isotoma finitima Stscherbakow.—Greenland: Franz Joseph Fjord Region, 1931-39. (M. H.) This species also found in British Isles, 1922.

Isotoma grandiceps Reuter.—Arctic Alaska: Anaktuvuk Pass, July 7, 1949, humus at base of *Salix*; Umiat, July 4, 1949, tundra, mostly of *Eriophorum*; Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on windswept tundra. (N. A. W.) A holarctic species.

Isotoma minor Schaffer.—Greenland: S. E. coast, Kangerdlugssuaq region, 1931-39. (M. H.)

Isotoma notabilis Schaffer.—Arctic Alaska: Anaktuvuk Pass, July 7, 1949, humus at base of *Salix*; Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on windswept tundra. (N. A. W.)

A European and possibly cosmopolitan species (Stach). He records it widely in Europe from many habitats but from no high altitudes.

Isotoma olivacea Tullberg.—Arctic Alaska: Umiat, July 4, 1949, tundra, mostly of *Eriophorum*; Pt. Barrow, July 13, 1949, census of lemming nest (*Dicrostonyx rubricatus*) on tundra; Fish Creek, lat. 70° 20' N., long. 150° 30' W., lemming nest (*Dicrostonyx rubricatus*) on windswept tundra;

Anaktuvuk Pass, July 7, 1949, humus at base of *Salix*. (N. A. W.)
Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast,
Scoresbysund, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

A common species, especially in northern Europe (Stach) and probably holarctic. Stach records it from a variety of habitats, including under stones covered by snow.

Isotoma palustris Muller.—Arctic Alaska: Demarcation Pt., May 16, 1914, under driftwood. (C. A. E.); Arctic Canada: Bernard Harbour, N. W. Terr., May 25, 1916, June 9, 1915, on the surface of ponds. (C. A. E.)
This species also found in the United States, Azores, India, Java, Siberia, Europe, Nova Zembla, Spitzbergen, and Bear Island.

Stach lists this under the genus *Isotomurus* Börner as a cosmopolitan species, being very common throughout Europe. It is usually found in wet places and is recorded up to 2430 m. on Polish mountains.

Isotoma violacea Tullberg.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Franz Joseph Fjord, 1931-39. (M. H.)

Isotoma viridis Bourlet.—Arctic Alaska: Umiat, July 4, 1949, tundra, mostly of *Eriophorum* (N. A. W.); Anaktuvuk Pass, July 7, 1949, humus at base of *Salix* (N. A. W.); Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on wind-swept tundra (N. A. W.); Pt. Barrow, June 28, 1949, lemming nest (*Dicrostonyx rubricatus*) on tundra (N. A. W.); Collinson Pt., May 16, 1914, under driftwood logs on tundra; Demarcation Pt., September 27, 1913, under driftwood (C. A. E.); Arctic Canada: Bernard Harbour, N. W. Terr., May, 1915, under loose stones; Arnprior, Ont., March-April, 1915 (C. A. E.); Ellesmere Land (Stach). Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Scoresbysund, Franz Joseph Fjord, 1931-39. (M. H.)

This species also found in Siberia, Spitzbergen, Bear Island, Iceland, and Europe. The color varies widely and many synonyms based on this character exist (Stach). It is a very common holarctic species found in a variety of biotopes and often on snow in Europe. It is not, however, everywhere a hardy species since it is not known beyond treeline in Poland. Stach records it in great numbers on snow in Poland at a temperature of 8° C. in January, moving quickly.

Isotoma sp.—Arctic Alaska: Oumalik, lat. 69° 50' N., long. 156° 00' W., July 16, 1949, tundra on bluff of lake; Fish Creek, lat. 70° 20' N., long.

151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on wind-swept tundra. (N. A. W.)

Isotomurus paulustroides Folsom.—Arctic Alaska: Umiat, July 4, 1949, tundra of valley floor. (N. A. W.)

Recorded by Stach only from Ontario. He describes a geographical subspecies (*subicliatus*) from Ukraina and Germany.

Prisotoma tenella Reuter.—Greenland: S. E. coast, Scoresbysound, 1931-39. (M. H.)

Pseudisotoma sensibilis (*Isotoma sensibilis*) Tullberg.—Arctic Alaska: Pt. Barrow, July 13, 1949, lemming nest (*Dicrostonyx rubricatus*) on tundra. (N. A. W.); Greenland: Upernavik, Godthaab-Julianehaab, S. E. coast, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, 1931-39. (M. H.)

Holarctic, and found in Swiss Alps to 3100 m. It is found "usually in moss, but also under loose bark of various trees, especially in lowlands; in the mountains it seeks shelter also in grass tufts and under stones" (Stach).

Tetracanthella wahlgreni Axelson.—Arctic Alaska: Pt. Barrow, July 13, 1949, lemming nest (*Dicrostonyx rubricatus*) on tundra. (N. A. W.) Arctic Canada: Bernard Harbour, N. W. Terr., June 18, 1915, on surface of pond. (C. A. E.); Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Scoresbysound, 1931-39. (M. H.)

This species also found in Norway, Sweden, Finland, Spitzbergen, and Bear Island. Stach considers it circumpolar and found to the south in the Holarctic Region only in the mountains (Poland, Hungary, Spain); he considers it an endemic Arctic species carried south during the Pleistocene and left as a relic in the more southern areas. It is primarily a moss species.

NEELIDAE

Megathorax minimus Willem.—Arctic Alaska: Fish Creek, lat. 70° 20' N., long. 151° 30' W., July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on wind-swept tundra; Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15, 1949, tundra on bluff of lake. (N. A. W.)

ONYCHIURIDAE

Onychiurus armatus Tullberg.—Arctic Alaska: Umiat, July 4, 1949, tundra mostly of *Eriophorum*; Pt. Barrow, June 30, 1949, lemming runways on tundra; Fish Creek, lat. 70° 20' N., long. 151° 30' W., lemming nest (*Dicrostonyx rubricatus*) on wind-swept tundra; Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15, 16, 1949, tundra on bluff of lake. (N. A. W.)

Greenland: Disco Fjord, Godthaab-Julianehaab, S. E. coast, Scoresbysound, Franz Joseph Fjord, 1931-39. (M.H.) This species also found in Bear Island, 1921, and in Spitzbergen, 1921.

Onychiurus duodecimpunctatus.—Arctic Canada: Bernard Harbour, N. W. Terr., May 19, 1915, in rotten driftwood in harbour. (C. A. E.)

Onychiurus groenlandicus Tullberg.—Greenland: Thule Region, Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M.H.)

Onychiurus pseudarmatus Folsom.—Greenland: Scoresbysound region; 1931-39. (M.H.)

Onychiurus sibiricus Tullberg.—Greenland: Franz Joseph Fjord region, 1931-39. (M.H.)

Onychiurus sp., undescribed (*sibiricus* group).—Arctic Alaska: Umiat, July 4, 1949, tundra mostly of *Eriophorum*. (N. A. W.)

PODURIDAE

Achorutes armatus Nicolet.—Arctic Canada: Arnprior, Ont., September, 1917. Bernard Harbour, N. W. Terr., May 25, 1916, June 18, 1915, on surface of ponds. Cockburn Pt., Dolphin Strait, Union Strait, N. W. Terr., July 15, 1916, moss in swamps. (C. A. E.) This species also found in Greenland, Spitzbergen, North Africa, Sumatra, Ceylon, New Zealand, Brazil, Uruguay, Chile, and the United States.

Achorutes muscorum Templeton.—Greenland: Godthaab-Julianehaab region, S. E. coast, 1931-39. (M.H.)

Achorutes sensilis.—Arctic Alaska: Pt. Barrow, August, 1948, in tundra. (N. A. W.) Arctic Canada: Bernard Harbour, N. W. Terr., July 5, 1916, on surface of pond. (C. A. E.)

Achorutes sp.—Arctic Alaska: Anaktuvuk Pass, July 9, 1949, valley floor. (N. A. W.)

Podura aquatica Linnaeus.—Arctic Alaska: Demarcation Pt., May 16, 1914. Arctic Canada: Arnprior, Ont., May 19, 1917; Bernard Harbour, N. W. Terr.; Dolphin and Union Straits, N. W. Terr., June 25, 1915, fresh-water ponds and streams. (C. A. E.) This species is also found in Europe and Siberia.

Xenylla humicola Fabricius.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Franz Joseph Fjord, 1931-39. (M.H.) This species also found in Bear Island and Spitzbergen. (S. & E.)

SMINTHURIDAE

Arrhopalites binnoculatus Börner.—Arctic Alaska: Oumalik, lat. 69° 50' N., long. 156° 00' W., July 15, 16, 1949, tundra on bluff of lake. (N. A. W.)

Arrhopalites pygmaeus Wankel.—Greenland, S. E. coast, Scoresbysound, Franz Joseph Fjord, 1931-39. (M.H.)

Bourletiella sp.—Arctic Alaska: Oumalik, lat. $69^{\circ} 50' N.$, long. $155^{\circ} 00' W.$, July 16, 1949, tundra on bluff of lake. Anaktuvuk Pass, July 6, 1949, humus at base of *Salix*. (N. A. W.)

Sminthurides malmgreni Tullberg.—Greenland: Upernavik, Disco Fjord, S. E. coast, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

Sminthurides sp.—Arctic Alaska: Anaktuvuk Pass, July 7, 1949, from humus about lichens, mosses, and higher plants on fully exposed, jagged rocks facing the pass, altitude 3,950 feet. (N. A. W.)

Sminthurinus concolor Meinert.—Greenland: Upernavik, Disco Fjord, Godthaab-Julianehaab, S. E. coast, Kangerdlugssuaq, Scoresbysound, Franz Joseph Fjord, N. E. coast, 1931-39. (M. H.)

Sminthurinus niger Lubbock.—Greenland: Scoresbysound region, 1931-39. (M. H.) This species also found on Bear Island, 1921. (S. & E.)

Sminthurus aquaticus Bourlet.—Arctic Alaska: Oumalik, lat. $69^{\circ} 50' N.$, long. $156^{\circ} 00' W.$, July 15, 16, 1949, tundra on bluff of lake. (N. A. W.) Arctic Canada: Bernard Harbour, N. W. Terr., May 25, 1916, July 9, 1915, on surface of ponds. (C. A. E.) This species also found in Europe and the United States.

Sminthurus viridis Linné.—Arctic Alaska: Fish Creek, lat. $70^{\circ} 20' N.$, long. $151^{\circ} 30' W.$, July 16, 1949, lemming nest (*Dicrostonyx rubricatus*) on wind-swept tundra. (N. A. W.); Umiat, July 4, 1949, tundra mostly of *Eriophorum*. (N. A. W.); Greenland: Scoresbysound region, 1931-39. (M. H.)

Sphaeridia pumulis Krausbauer.—Arctic Alaska: Anaktuvuk Pass, July 6, 1949, humus at base of *Salix*. (N. A. W.)

Order PROTURA

(Proturans)

These primitive, rare and minute insects were not hitherto known from the Arctic and Ewing in his 1940 monograph on Protura of North America lists none from here. They were unexpectedly taken twice in 1949. At Anaktuvuk Pass at an elevation of 3950 feet they were found in humus about lichens, mosses, and higher plant roots on fully exposed jagged rocks facing the pass. From just below the summit of Umiat Mt. above the Colville River at an elevation of about 900 feet the insects were taken on the warmest exposure possible, the south side of the bluff, among humus. Both records are of *Acerentulus* sp. (Family Acerentomidae).

Order EPHEMEROPTERA

(Mayflies)

Mayflies were not taken on the Canadian Arctic Expedition in either Canada or Alaska and were not seen in 1948 following arrival in the Arctic after mid August. The adults, while with immatures one of the most important foods for fresh water fishes in temperate regions, are so fragile that life on the tundra would seem to be hazardous. They were, however, encountered in July 1949 in Anaktuvuk Pass as subimago females. The life of an average individual is extremely short and the emergence of all adults would appear to take place only at the height of the brief summer.

BAETIDAE

Baetis sp.—Alaska: Anaktuvuk Pass, July 6-8, 1949, at noon along stony creek. (N. A. W.)

Subimago females were occasionally seen on these days and individuals were seen as late as July 23. Members of this order were not reported by the Canadian Arctic Expedition and it is probable that their role as important food for fresh-water fishes in the Arctic is taken over by caddis flies and midges, young and adult. Burk (*personal communication*) believes that these insects overwinter in the Arctic in the egg stage and have an extremely short life in the nymph and adult stages. McDunnough reports mayflies from Baffin Land.

Order THYSANOPTERA

(Thrips)

Thrips are generally inconspicuous insects, noticed usually on flowers, and were not taken by the Canadian Arctic Expedition. Species of at least two genera were taken in the tundra from Pt. Barrow to Anaktuvuk Pass, several times in humus at the base of *Salix*, including *S. glauca* var. *acutifolia*.

Thrips sp.—Alaska: Pt. Barrow, September 1, 1948, males and females in the surface layer of tundra with a temperature of 36° F., the temperature at a depth of four centimeters being 32° F. and below this the ground being frozen; Anaktuvuk Pass, August 25, 30, 1948, on galls of *Salix* and in humus at base of *Salix*. (N. A. W.)

Aptinotrips sp.—Alaska: Anaktuvuk Pass, July 9, 1949, nymphs and adults on tundra of valley floor. (N. A. W.)

Unidentified thrips were taken at Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, at base of *Salix glauca* var. *acutifolia* (Hook) and at Umiat, July 3, 1949, on top of valley. (N. A. W.)

Order ANOPLURA

(Sucking Lice)

Sucking lice were recorded in Alaska from the bearded seal and the Arctic fox, by the Canadian Arctic Expedition. The 1948 reconnaissance resulted in the discovery of these lice on the Pacific walrus at Pt. Barrow for the first time, of a genus different from that of the seal. The problem of transfer of such parasites from one animal to another is of particular interest since it would appear to be especially difficult on marine animals at low temperatures. In view of the significance of lemmings to several problems, the 1949 discovery of lice on them was a welcome addition to the biology of these animals. They were also taken on the ground squirrel, *Citellus parryi*, subspecies.

ECHINOPHTHIRIIDAE

Anatartophtirius trichechi (Boheman).—Alaska: Pt. Barrow, August 20, 1948, off Pacific walrus, *Odobenus divergens* (Ill.). (N. A. W.)

Distribution.—Off *Odobenus rosmarus* (L.) of Greenland and Spitzbergen. *Echinophtirius horridus* (Olfers).—Alaska: Beaufort Sea, off bearded seal, *Phoca hispida* Schreber. (C. A. E.). A bearded seal at Pt. Barrow, July 27, 1949 was examined for lice and none was found. The Eskimos reported them to be free of external parasites.

Distribution.—Off *Phoca* spp. of Europe, Greenland, Alaska and California.

HAEMATOPINIDAE

Hoplopleura acanthopus (Burm.).—Alaska: Pt. Barrow, June 29, 1949, off tawny lemming, *Lemmus alascensis* Merriam. (N. A. W.) Mites were also present on the fur. Recorded by Ferris from *Lemmus alascensis* and "white lemming" (probably *Dicrostonyx rubricatus*) at Pt. Barrow.

Distribution.—Holarctic, off Muridae.

Linognathus setesus (Olfers).—Alaska: Cross Island, January 18, 1948, off Arctic fox, *Alopex lagopus innuitus* (Merriam). (C. A. E.)

Distribution.—Off domestic dog and coyote; widespread.

Neohaematopinus laevisculus (Grube).—Alaska: Anaktuvuk Pass, off immature ground squirrels, *Citellus parryi* subspecies, July 28, 1949, brought to Pt. Barrow on July 8. (N. A. W.)

Distribution.—Holarctic, off Sciuridae, especially *Citellus* spp., *Cynomys*, *Marmota* and *Callospermophilus*.

Order ODONATA

(Dragonflies and Damselflies)

While not known from Arctic Alaska it is possible that stragglers could reach this area through Anaktuvuk Pass. Certainly the numerous swift streams, clear water and abundant food would seem to offer entirely suitable conditions.²

Order ORTHOPTERA

(Cockroaches, Grasshoppers and their allies)

Apparently grasshoppers occur rarely in this area, but the Canadian Arctic Expedition record is the only one to date. Even at McKinley Park and Fairbanks grasshoppers appear sparingly in what appear to be ideal habitats. They also would be expected to straggle through to the region through such places as Anaktuvuk Pass.

The occurrence of this order in the Arctic rests on a single female in poor condition of *Melanoplus frigidus* (Bohemian) (Acrididae) from Langton Bay, Northwest Territories and on several specimens taken on the International Boundary (longitude 141° W., latitude 69° 20' N. on August 8, 1912. (C. A. E.) Specimens of other insects taken with the same collection bore the

² Since the above was written, the prediction was strikingly verified July 8, 1950 at Umiat in latitude 69° 24' N., far out on the Arctic Plateau, when three dragonflies were watched hawking at the margin of the vegetation about a pond on the floor of the Colville River Valley. The temperature had reached a high of 72° on this day and had been preceded by several days of unusually calm and warm weather. It is quite possible that these insects could have flown up from the Yukon drainage by way of such a pass as Anaktuvuk. Under the limited time and other conditions they were not captured but *Cordulia shurtleffi* Scudder, *Somatochlora albicincta* (Burmeister) and *S. hudsonica* (Hagen) have been recorded from Fort Yukon, roughly 260 miles southeast (Gloyd, 1939, Ent. News, 50: 11-16).

A male *Enallagma boreale* Selys (det. Dr. P. P. Calvert) was later (July 27) taken here by my assistant, David Trumper. The earlier specimens represented a larger and heavier species, probably of *Somatochlora*.

label (lat. $59^{\circ} 10' N.$ – $69^{\circ} 40' N.$, long. 141°), so that there is a possibility that the grasshoppers could have been taken farther south. The Langton Bay specimen was believed to have been brought with other insects by an Eskimo from 20 to 40 miles inland on the Horton River on the south side of the Melville Mountains, a range of hills about 1000 feet high. *Melanoplus frigidus* was also taken by me in Mt. McKinley Park, Alaska, August 4, 1949. It is a palearctic species known from "Norway, Lapland and Siberia, and as a glacial relict in the Swiss Alps and the Tyrol". (Hebard, quoted by C. A. E.) The record of *Melanoplus m. mexicanus* (Sauss.) from Fairbanks, Alaska, September 7, 1948, was believed to be about a peripheral record for this species. (Weber, 1949, p. 121.)

Order PLECOPTERA

(Stoneflies)

These are one of the most important foods for fresh-water fishes, but were not hitherto recorded from Arctic Alaska. Ten species were taken in 1948–49 and numerous specimens were taken from grayling and other fish stomachs.

PERLIDAE

Arcynopteryx americana Klapalek (*minor* Klapalek).—Alaska: Anaktuvuk Pass, July 9, 1949, under 15 cm. stone and alighting on me near river. (N. A. W.)

This large and dark species appeared to be much less abundant than *Nemoura trispinosa* here. Ricker (1944) records it in Alaska only from Mt. McKinley Park but also from Baffin Land, Mackenzie (latitude $64^{\circ} 25' N.$), Keewatin (latitude $63^{\circ} 01' N.$), and the western Canadian provinces. The species corresponds closely to the descriptions of the European *compacta*.

Alloperla diversa Frison.—Alaska: Anaktuvuk Pass, July 6–8, 22, 1949. (N. A. W.)

This species occurred with the mayfly, *Baetis*, along small stony creeks but was also taken at 4500 feet in the lee of a boulder on the north side of a precipitous mountain slope. This circumstance indicates the manner in which such insects could be carried by the

wind from the Yukon drainage to the south through this broad pass. Not listed by Ricker from the Arctic or sub-Arctic but is considered (*in litteris*) a Cordilleran species.

CAPNIIDAE

Capnia confusa Claassen (*nivalis* Neave).—Alaska: Anaktuvuk Pass, July 6, 1949, along small stony creek at noon. (N. A. W.) Considered by Ricker (*in litteris*) to be a "Cordilleran species and not recorded hitherto from the North."

Capnia nearctica Banks.—Canada: Bernard Harbor, Northwest Terr., June 25, 1915. (C. A. E.)

Capnia nearctica - *hantsschi* group.—Alaska: Anaktuvuk Pass, July 9, 1949, resting close to the wind-swept sand of the Anaktuvuk River shore. (N. A. W.)

Capnia oenone Neave.—Alaska: Anaktuvuk Pass, August 26, 1948, males and females crawling on stem of dwarf *Salix* on island in stream and walking on snow with surface temperature of 29° F. (N. A. W.) Hitherto known only from southern British Columbia (Ricker).

NEMOURIDAE

Nemoura oregonensis Claassen.—Alaska: Anaktuvuk Pass, July 6, 1949, along small stony creek at noon. (N. A. W.) Considered by Ricker (*in litteris*) to be a Cordilleran species.

Nemoura trispinosa Claassen.—Alaska: Pt. Barrow, July 29-30, 1949; Anaktuvuk Pass, July 5-10, 1949, August 26, 1948. (N. A. W.) Other locality: Canada: Bernard Harbor, Northwest Terr., June 30, 1916 (as *Nemoura* sp.). (C. A. E.)

Considered by Ricker (*in litteris*) to be an Arctic-eastern species. Evidently the common species at Pt. Barrow where both adults and nymphs were taken on the above days. The tundra in the immediate vicinity of Pt. Barrow appears unsuitable, perhaps because of windiness or human intervention, but back several miles the insects are reared in the innumerable small ponds bordered by a comparatively lush growth of vegetation. At such a pond the chief grass was *Colpodium fulva* (det. Spetzman). At Anaktuvuk Pass the nymphs live at the margins of clear stony streams, taking refuge under the rocks. Adults flutter about the bushy margins.

Nemoura sp. A.—Alaska: Anaktuvuk Pass, July 6, 1949, along small, stony creek. (N. A. W.)

Nemoura sp. BB.—Alaska: Anaktuvuk Pass, July 5, 22, 1949. (N. A. W.)

Females of this species, which may be undescribed, were taken three times on the rugged mountain slopes at elevations of 2500–4550 feet (some 1300–2350 feet above the pass) where they must have been blown by the strong winds or fluttered up in stages. Two were attached to a small rock and another was clinging to the underside of a small rock at the summit (4550 feet) of a mountain. Mature nymphs of perhaps the same species were taken on the floor of the pass under a small (3–10 cm.) stone in an eddy of still water of an otherwise swift mountain stream. Over one hundred stones were overturned in finding five nymphs. One, placed in a rearing cage, emerged as an imago on the fourth day following.

Order MALLOPHAGA

(Bird Lice, Chewing Lice)

Most of the species are ectoparasites of birds. Since many birds come to the Arctic in the summer, a large list of Mallophaga could be compiled by listing the known kinds from these. The Arctic collectors of birds have not as a rule made much effort to collect the ectoparasites. Since most of the parasites leave the dead bird as soon as it chills, the opportunity to collect such insects is brief and the busy bird collector has little time for such searching.

Fourteen species of Mallophaga have now been identified from birds in Arctic Alaska, including the pomarine jaeger, snowy owl and snow bunting.

The family Trichodectidae, occurring only on mammals, was taken in 1948 from the Arctic weasel.

MENOPONIDAE

Myrsidea, or near.—Alaska: Pt. Barrow, August 23, 1948, nymph off Golden Plover. (N. A. W.)

Trinoton quarquedulae (L.).—Alaska: Barter Island, June, 1941, from pin-tail duck (*Dafila acuta* L.). (C. A. E.)

PHILOPTERIDAE

Anaticola sp.—Alaska: Pt. Barrow, July, 1949, of nymphs and adult male off Steller's eider duck. (N. A. W.)

Degeeriella complexiva Kell. and Chap.—Alaska: from *Tringa canutus* and *Tringa (Arquatella) couesi*. Other locality: Canada: Bernard Harbor, Northwest Terr., June, 1916, off Baird's sandpiper, *Pisobia (Actodromas) bairdi* (Coues). (C. A. E.)

Degeeriella normifer (Grube).—Alaska: Pt. Barrow, July 14, 1949, off male pomarine jaeger. (N. A. W.)

Degeeriella vulgata Kellogg.—Alaska: Demarcation Point, May, 1914, off Gambel's sparrow (*Zonotrichia leucophrys gambeli* (Nuttall)). (C. A. E.)

Ethiopterum modestum (Giebel).—Alaska: Pt. Barrow, July 14, 1949, off male and female pomarine jaeger. (N. A. W.)

Goniodes mammillatus Rudow.—Alaska: Demarcation Point, May, 1914, off rock ptarmigan (*Lagopus lagopus* (L.)). (C. A. E.) Other locality: Canada: Bernard Harbor, Northwest Terr., off rock and willow ptarmigans [sic] (*Lagopus rupestris* and *lagopus*). (C. A. E.)

Lipeurus protervus Kellogg.—Alaska: Demarcation Point, off rock and willow ptarmigans [sic] (*Lagopus rupestris* and *lagopus*) and from Lapland longspur (*Calcarius lapponicus*). Other locality: Canada: Bernard Harbor, Northwest Terr., off rock and willow ptarmigans. (C. A. E.)

Perineus laculatus (Kell. and Chap.).—Alaska: Pt. Barrow, July, 1949, off pomarine jaeger. (N. A. W.)

Philoferus ceblebrachys Nitzsch.—Alaska: Barter Island, June, 1914, Pt. Barrow, off snowy owl (*Nyctea nyctea* (L.)). (C. A. E.)

Philoferus cursor Nitzsch.—Alaska: Barter Island, Demarcation Point, May, 1914, from short-eared owl (*Asio flammeus* (Pont.)), *A. accipitrinus* (Pall) [sic]. (C. A. E.)

Philoferus pustulosus Nitzsch.—Alaska: Camden Bay, June, 1914, off parasitic jaeger (*Stercorarius (Lestris) parasiticus* (L.)). (C. A. E.)

Philoferus subflavescens Geoff.—Alaska: Demarcation Point, off snow bunting (*Plectrophenax (Emberiza) nivialis* (L.)) Lapland longspur (*Calcarius lapponicus* (L.)) and Gambel's sparrow (*Zonotrichia leucophrys gambeli* (Nutt.)). (C. A. E.) Other locality: Canada: Bernard Harbor, Northwest Terr., off snow bunting. (C. A. E.)

TRICHOECTIDAE

A small family, unusual in occurring only on mammals.

Trichodectes mephitis Osborn.—Alaska: Anaktuvuk Pass, August 27, 1948, off Arctic weasel, *Mustela a. arctica* (Merriam). (N. A. W.)

Trichodectes?.—Record based on "a statement that a red fox, *Vulpes alascensis* (Merriam), taken along the Sadlerochit river, in northern Alaska, had a species of *Trichodectes* (?) in its fur. Unfortunately no specimens were preserved" (Baker, 1919, p. 5). (C. A. E.)

Order HETEROPTERA

(True Bugs)

Hemipterous bugs are not numerous in the Alaskan Arctic but *Chiloxanthus stellatus* (Curtis) appears widely distributed and

well adapted. At Pt. Barrow the bugs prefer to jump rather than fly, and run under cover when pursued. The fact that *Anthocorus melanocerus* Reuter was taken in copula August 24 indicates that true bugs spend the first winter in the egg stage and nymphs taken September 13 indicate not only that they may overwinter also in this stage but that several summers are required to reach maturity. There is one record of water boatman (*Arctocorixa*) in the Alaskan Arctic and search should be made for others.

ANTHOCORIDAE

Anthocoris melanocerus Reuter.—Alaska: Umiat, August 24, 1948, a pair in copula in *Alnus* thicket; Anaktuvuk Pass, August 25, 1948, at base of *Salix*. (N. A. W.)

MIRIDAE

Chlamydatus sp., probably.—Alaska: Anaktuvuk Pass, July 10, 1949, nymph under stone. (N. A. W.)

Plagiognathus sp., possibly.—Alaska: Anaktuvuk Pass, July 10, 1949, nymph under stone. (N. A. W.)

SALDIDAE

Chiloxanthus stellatus (Curtis).—Alaska: Demarcation Point, May 16, 1914; west of Konganevik, Camden Bay, July 4, 1949; Collinson Point, September 13, 1913 (nymphs). (C. A. E.). Pt. Barrow, June 28, 1949 (nymph in lemming nest), June 30, 1949, on tundra. (N. A. W.) Other locality: Canada: mouth of Mackenzie River; Bernard Harbor, Northwest Terr., July 15, 1945 (adults) and June 20, 1916 (nymphs). (C. A. E.)

Calacanthia trybomi J. Sahlberg.—Alaska: Collinson Point, June 23, 1914. Other locality: Canada: Bernard Bay, Northwest Terr., June 19, 1915 (nymph). (C. A. E.)

CORIXIDAE

Arctocorixa sp.—Alaska: Teller, August 6, 1913. (C. A. E.)

Order HOMOPTERA

(Aphids, Plant Lice, Coccids)

The soft bodied, juicy aphids and coccids would seem ill-suited to Arctic conditions yet they may be found at the bases of roots at Anaktuvuk Pass and on Umiat Mt. They feed on the sap of *Salix* roots and other plants.

A fragile-appearing cicadellid (*Balclutha* sp.) was taken as it

burrowed into snow at a temperature of 28° F. Other fragile Homoptera (psyllids) of four or more species occur at least as far north as Umiat (69°) as do the more compact leafhoppers.

APHIDAE

Pemphigus sp.—Alaska: Anaktuvuk Pass, August 26, 1948, under small stones on roots of herbs on vegetation islands in stream bed. (N. A. W.)

Prociphilus sp., probably.—Alaska: Anaktuvuk Pass, August 26, 1948. (N. A. W.)

CICADELLIDAE

Balclutha sp.—Alaska: Anaktuvuk Pass, August 28, 1948, burrowing into snow patch at 5:45 p.m., the surface of the snow being 28° F., air temperature 32°. (N. A. W.)

Deltocephalus or related genus.—Alaska: Umiat Mt., 900 feet, July 11, 1949, on south slope of precipitous bluff. (N. A. W.)

COCCIDAE

Phenacoccus undescribed sp.—Alaska: Umiat Mt., 900 feet, July 11, 1949, on south slope of precipitous bluff. (N. A. W.)

Phenacoccus sp., possibly.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., nymphs from humus cover under thicket of *Salix glauca* var. *acutifolia* (Hook).

Pseudococcus sp., possibly undescribed.—Alaska: Anaktuvuk Pass, July 10, 1949, 3100 feet, from summit of mountain in humus about roots of *Salix*, *Potentilla*, grasses, etc.

Puto spp., including undescribed spp.—Alaska: Umiat, July 2-4, 1949, larvae on *Alnus*, females in dry and sunny spot 400 feet above Colville, and under *Alnus*, *Salix* and *Betula nana*; Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, in humus under thicket of *Salix glauca* var. *acutifolia* (Hook); Anaktuvuk Pass, August 30, 1948, base of dwarf *Salix*, July 5, 1949, at 3200 feet; on southeast slope of mountain, July 6, 1949, larvae at base of *Salix Alexensis*, July 7, 1949, larvae at 3950 feet, in humus on talus slope. (N. A. W.)

JASSIDAE

Euscelis hyperboreus Van Duzee.—Alaska: west of Kongenevik, Camden Bay, June 27, 1914, male. Other locality: Canada: Bernard Harbor, Northwest Terr., July 15, 1915, female. (C. A. E.)

Euscelis sp.—Alaska: west of Kongenevik, Camden Bay, June 27, 1914. (C. A. E.)

PSYLLIDAE

Psylla alaskensis Ashm.—Alaska: Umiat, August 24, 1948, in *Alnus* thicket. (N. A. W.)

Psylla sp., near *alaskensis* Ashm.—Alaska: Anaktuvuk Pass, July 8, 1949, from sweeping over tundrae, 9 p. m. (N. A. W.)

Psylla sinuata Crawf.—Alaska: Anaktuvuk Pass, August 26, 1948. (N. A. W.)

Psylla sp.—Alaska: Umiat, July 4, 1949, from tundra material, mostly *Eriophorum*. (N. A. W.)

Trioza sp., near *varians* Crawf.—Alaska: Anaktuvuk Pass, August 28, 1948. (N. A. W.)

Order NEUROPTERA

(Lacewings, Aphis and Ant-lions)

Members of this order, *sensu strictu*, were not recorded by the Canadian Arctic Expedition but what was apparently an aphis-lion was taken at Anaktuvuk Pass on a *Salix* gall. In view of the proved presence of aphids here they should be expected but may well be scarce or local.

Order COLEOPTERA

(Beetles)

Beetles are not nearly as numerous in the Arctic as in temperate regions. Up to the present time about 50 species are known from the Alaskan Arctic. The most numerous beetles appear to be the carnivorous Carabidae, of which three or four species appear to be common. A noteworthy omission is the group of wood-inhabiting families including the Cerambycidae which are known from immediately south of tree line. The rover beetles or Staphylinidae are not uncommon and are involved in the lemming nest biome, perhaps preying on other insects and mites.

CANTHARIDAE

(Blister Beetles)

Cantharis sp.—Alaska: Umiat Mt., 900 feet, July 11, 1949. (N. A. W.)

CARABIDAE

(Carnivorous Ground Beetles)

Amara brunnipennis Dej.—Alaska: Nome, August 24-25, 1916; Kongonevick, Camden Bay, June 27, 1914; west of Collinson Point, June 12, 1914.

(C. A. E.) Other localities: Canada: Franklin Bay, Cockburn Point, Dolphin and Union Strait, September 7, 26, 1914; Bernard Harbor, May 18 to September 1, 1915-16; Kugalik River, Wollaston Peninsula, Victoria Island, August 18, 1915, all Northwest Terr. (C. A. E.)

Asaphidion (Tachypus, auct.).—Alaska: west of Collinson Point, June 12, 1914 (C. A. E.); Anaktuvuk Pass, July 9, 1949, on river sandbar. (N. A. W.)

Bembidium complanulum Mann.—Alaska: Nome, August 21-24, 1916. (C. A. E.)

Bembidium sp.—Alaska: Anaktuvuk Pass, July 9, 1949, on river sandbar. (N. A. W.)

Curtonatus sp.—Alaska: Anaktuvuk Pass, August 30, 1948. (N. A. W.)

Cryobius spp.—Alaska: Anaktuvuk Pass, August 28, 1948, July 5, 7, 9, 10, 22, 23, 1949 (to 3200, 3600, 3800 and 4000 feet). (N. A. W.)

Elaphrus riparius var. *gratiosus* Mann.—Alaska: Teller, July 31, 1913. (C. A. E.)

Elaphrus sp.—Alaska: Anaktuvuk Pass, July 9, 1949, on sandbar along Anaktuvuk River. (N. A. W.)

Notiophilus sp.—Alaska: Anaktuvuk Pass, 3200 feet, July 5, 1949; Oumalik, latitude 69° 50' N., Longitude 156° 00' W., July 15, 1949. (N. A. W.)

Nebria sp., near *bifaria*.—Alaska: Collinson Point, May 9, 1914. (C. A. E.)

Carabus truncatocollis Esch.—Alaska: Anaktuvuk Pass, June, 1949 (T. Brower); Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, dying in tundra pond. (N. A. W.)

Carabus viettinghovi Adams.—Alaska: Umiat, top of valley, 750 feet, July 3, 1949. (N. A. W.)

Carabus chamissonis Fisch.—Alaska: Umiat, top of valley, 750 feet, July 3, 1949. (N. A. W.)

Pelophila eschscholtzii Mann.—Alaska: Teller, July 29, 1913. (C. A. E.)

Pterostichus (Lyperophorus) agonus Hom.—Alaska: Konganevick, Camden Bay, June 27, 1914; Collinson Point, September 27, 1913, June 1, 1914; Barter Island, June 11, 1914; Demarcation Point, May 20, 1914 (C. A. E.); Anaktuvuk, July 5, 1949. (N. A. W.) Other locality: Canada: Langton Bay, Franklin Bay, Northwest Terr. (C. A. E.)

Pterostichus mandibularis Kby.—Alaska: Konganevick, Camden Bay, June 27, 1914; Collinson Point, September 22, 27, 1913; Demarcation Point, May 6, 14-20, 1914. (C. A. E.) Other localities: Canada: Alaska border, Demarcation Point, Yukon, May 6, 1914; Cockburn Point, Dolphin and Union Strait, September 7, 1914; Bernard Harbor, June 15, 20, 1916, all Northwest Terr. (C. A. E.)

Pterostichus similis Men.—Alaska: Teller, July 24, 1913. (C. A. E.)

Pterostichus vindictus Mann.—Alaska: Nome, August 21-24, 1916; Teller, July 24, 1913. (C. A. E.)

Unident. spp.—Alaska: Pt. Barrow, Anaktuvuk Pass, Umiat. (N. A. W.)

CHRYSEMELIDAE

(Ladybird Beetles)

Chrysomela subsulcata Mann.—Alaska: Konganevik, Camden Bay, June 27, July 4, 1914; Collinson Point, June 18, 1914, September 2, 1914, September 27, 1913. (C. A. E.); Pt. Barrow, July, 1950. (N. A. W.)

CURCULIONIDAE

(Weevils)

Apion sp.—Alaska: Umiat Mt., 900 feet, July 11, 1949, attacked by the red mite, *Leptus* sp. (Erythraeidae). (N. A. W.)

Lepidophorus lineaticollis Kby.—Alaska: Anaktuvuk Pass, August 25, 1948; in the vicinity of Eskimo racks of drying caribou meat in the open, July 7, 1949, 2600 feet, under rock on mountain slope in tangle of humus, roots and lichens. (N. A. W.)

DYTISCIDAE

(Water Beetles)

Agabus infuscatus Aube.—Alaska: Teller, July 29, 1913. (C. A. E.)

Agabus nigripalpis Sahlb.—Alaska: Teller, August, 1913; Collinson Point, September, 1913; Barter Island, July, 1914; Demarcation Point, May, 1914. (C. A. E.) Other localities: Canada: Bernard Harbor, May-August, Colville Mountains, Wollaston Peninsula, Victoria Island, July, 1914, Northwest Terr. (C. A. E.)

Agabus obsoletus Sec.—Alaska: Collinson Point, September, 1913. (C. A. E.)

Colymbetes dolobratus Payk.—Alaska: Teller, July, 1913. (C. A. E.) Other locality: Canada: Bernard Harbor, Northwest Terr., May-July. (C. A. E.)

Hydroporus humeralis Aube.—Alaska: Teller, August, 1913; Konganevik, Camden Bay, June, 1914; Demarcation Point, May, 1914. (C. A. E.) Other locality: Canada: Bernard Harbor, Northwest Terr., June-July. (C. A. E.)

Hydroporus tartaricus Lec.—Alaska: Collinson Point, September, 1913; Demarcation Point, May, 1914. (C. A. E.) Other locality: Bernard Harbor, Northwest Terr., May-August. (C. A. E.)

Hydroporus sp.—Alaska: Anaktuvuk Pass, August 26, 1948, in 39° F. pool beside river. (N. A. W.)

Tlybius angustior Gyll.—Alaska: Teller, August, 1913. (C. A. E.)

Unident. spp.—Alaska: Pt. Barrow, Anaktuvuk Pass. (N. A. W.)

ELATERIDAE

(Click Beetles)

Cryptohypnus sp. (probably *nocturnus* Esch.).—Alaska: Anaktuvuk Pass, August 25, 1948, larva. (N. A. W.)

Hypolittus sp., near *abbreviatus* Say but apparently new or palearctic.—Alaska: Umiat Mt., 900 feet, July 11, 1949. (N. A. W.)

Negastrius tumescens (Lec.).—Alaska: Umiat Mt., 900 feet, July 11, 1949. (N. A. W.)

SCYDMAENIDAE

Genus undetermined.—Alaska: Anaktuvuk Pass, July 9, 1949, tundra of mid-valley floor. (N. A. W.)

SILPHIDAE

(Carion Beetles)

Thanatophilus lapponica Hbst. (= *Silpha lapponica* Hbst.).—Alaska: Konganevik, Camden Bay, July 4, 1914 (C. A. E.); Anaktuvuk Pass, August 30, 1948, July 5, 1949; Noluk L., Lat. 68° 47' N., Long. 160° 0' W., July 6, 1950, from dead caribou. (N. A. W.) Other localities: Canada: Port Epworth July 15, 1915, Kogluktualuk River, Coronation Gulf, July, 1915. (C. A. E.)

Thanatophilus trituberculata Kby.—Alaska: Anaktuvuk Pass, July 9, 1949, large black larva crawling over sandbar of Anaktuvuk River, emerging as imago July 25. (N. A. W.)

STAPHYLINIDAE

(Rove Beetles)

OMALIINAE

Unidentified larvae.—Alaska: Pt. Barrow, September 1-2, 1948, in tundra. (N. A. W.)

STAPHYLININAE

Micralymma brevilungue Schiodte.—Alaska: Pt. Barrow, September 1, 1948. (N. A. W.)

Tachinus apterus Maklin.—Alaska: Pt. Barrow, September 1, 1948, in tundra. (N. A. W.)

Unidentified spp.—Alaska: Pt. Barrow, June-August, 1949, larvae and adults in lemming nests. (N. A. W.)

TACHYPORINAE

Unidentified larvae.—Alaska: Pt. Barrow, August 20-23, 1948, in tundra. (N. A. W.)

Order TRICHOPTERA

(Caddis-flies, Caddis-worms)

The adults, known as caddis-flies, are among the hardest Arctic insects and are widespread. The larvae are aquatic and form cases of woody material or grains of sand; they live in clear streams and lakes and are important food for fresh-water fishes.

LIMNEPHILIDAE

Anabolia emarginata Banks.—Alaska: Teller, July 29, 1913. (C. A. E.)

Grensia praeterita (Walk.).—Alaska: Anaktuvuk Pass, 1948, 1949, apparently the commonest species here; adults were taken to August 30 and larvae to August 26 in a pool with a black muck bottom at the tundra margin of a stream (31° F.) in the floor of the pass (N. A. W.); Meade River (L. Irving); Inaru River (Lat. 70° 54', Long. 156° 37') (L. Irving).

At the Inaru River Dr. Laurence Irving made the following observations on what were definitely determined as this species: "As I was fishing through the ice, about 10 inches thick, for grayling and walked up a small tributary stream near the Fish Camp, I noticed a fly on the ice, walking. It was like the Trichoptera, *Grensia praeterita* (Walk.) found on the snow on the 28th of September a year ago a little higher up the river and similar to those found earlier on the Meade River which the grayling were stuffed with.

"Looking further, I found a great many and in about 15 minutes picked up 30. They crawled actively, but did not move their wings. However, they were exploring with their long antennae and when I stood within about 5 feet of one, it walked toward me. If I moved around it followed. When I approached two which were diligently walking in the opposite direction, as I came within about 6 feet they turned and headed directly at me. These were all on ice, but on clear snow at the bank they did not seem attracted to me.

"The wind was about 20 miles from the East and only slightly screened by the banks two or three feet high. The stream was about 50 feet wide, the ice was rather smooth and on the lea side was a band of overflow about 10 to 20 feet wide. In general the direction of movement was downwind, and I watched to see if they crossed into the shelter of the tundra grasses. Quite a number

approached the snow, which rose about 2 feet in 15 to the tundra with grass tips protruding, and there seemed confused, some going out onto the ice again and others following a long diagonal course. Only one that I watched made the incline in about 15 minutes of rather purposeful climbing until it reached a large cluster of protruding grass which it entered. It did not pass down the first scattered grass tips but persisted until a large tuft was reached.

"These flies were alert and crawled at a pretty good tempo although the air temperature was about -3° . This day and the two preceding had been mild through the entire 72 hours, but not melting, and they had been preceded by two weeks hard freezing weather mostly from -10° to 20° . While the sun had occasionally been bright it gave no warmth or melting, and so these flies had been exposed to at least two weeks of hard freezing weather with light snow cover. During that time lakes had frozen to 10 to 12 inches and even under the snow the ground was frozen 6 to 12 inches. In the morning the wind was somewhat stronger but still only a few degrees below freezing. I looked along the creek and found only one fly walking alertly over the ice.

"Since I saw no movement of the wings, I think that the flies were trapped by walking into the stream ice and collected there. They probably are come too late to this winged stage for survival or to leave any influence upon the future of their race, but still keep searching for whatever would be their usual occupation in life if opportunity were present for its pursuit."

Under the name of *Chilostigma praeterita* Walker this species is recorded from Canada: Bernard Harbour, Northwest Terr., September 23, 1915. (C. A. E.)

Limnephilus sp.—Alaska: Pt. Barrow, July 30, 1949, larvae in tundra pools about seven miles south southeast of the settlement. (N. A. W.) There were in addition larvae, pupae and adults of both sexes of *Micrasema scissum* in the same pools at the same time.

Limnephilus sp.—Alaska: Nome, August 21, 1916, female. (C. A. E.)

Pycnopsyche sp.—Alaska: Anaktuvuk, July 23, 1949, larvae in stomach of whitefish from Tolugak Lake. (V. Walters.)

Micrasema scissum McL.—Alaska: Head of Nanushuk River, lat. $68^{\circ} 24'$ N., long. $150^{\circ} 30'$ W., July 22, 1949, males and females flying on a calm, warm day (N. A. W.); Pt. Barrow, seven miles south southeast, July 29-30, 1949, larvae, pupae, males and females. (N. A. W.)

At the latter site the adults were hovering and fluttering about the small tundra pools which were partially filled with sphagnum moss; they also were resting among grasses and sedges at the margins of pools along with adult stoneflies, whose nymphs occurred in the same pools.

Radema arcticum Boh.—Alaska: Anaktuvuk Pass, July 23, 1949, female on meadow beside Tolugak Lake at 9:30 a.m. of a bright, warm and calm day (N. A. W.); Pt. Barrow, July 29, 1949, both on tundra back of camp and about seven miles south southeast (see *Limnephilus* and *Micrasema scissum*), hovering and fluttering about small tundra pools. (N. A. W.)

PHRYGANEIDAE

Banksiola sp.—Alaska: Pt. Barrow, July 29, 1949, females about tundra pools. (N. A. W.)

Order HYMENOPTERA

(Bees, Wasps and Ants)

The Hymenoptera of special interest and conspicuousness are the bumblebees, although the parasitic forms are much more numerous. To one accustomed to the sluggishness of insects at cool temperatures in the temperate or tropical regions it seems strange to see bumblebees active at near freezing temperatures. Their thick coat of hairs serves well to retain the heat of muscular activity as they buzz about the flowers. Seven species of *Bombus* are recorded.

One species of social wasp is known here; the wasps otherwise are solitary and parasitic. Among the wingless insects of the tundra are the ant-like *Myrmar* and *Gelis*. Sawflies (Tenthredinidae) are not uncommon and ten species are known. They are fed upon by fresh-water fishes as the opportunity occurs. Only two species of ants are definitely known from Arctic Alaska (*Leptothorax acervorum canadensis* and *Camponotus herculeanus*) both having a wide distribution through northern United States and in the Rocky Mountains farther south. They are holarctic or nearctic equivalent of palearctic species as is *Formica fusca* which will probably be found here.

TENTHREDINIDAE

(Sawflies)

Amauronematus aulatus MacG.—Alaska: Barter Island, June 16, 1914. (C. A. E.)

Amauronematus cognatus MacG.—Alaska: Demarcation Point, pupa May 14, imago June 23, 1914. (C. A. E.)

Amauronematus completus MacG.—Alaska: Collinson Point, June 20, 1914. (C. A. E.)

Amauronematus digestus MacG.—Alaska: West of Konganevik, Camden Bay, July 4, 1914. (C. A. E.)

Amauronematus indicatus MacG.—Alaska: West of Konganevik, Camden Bay, July 4, 1914. (C. A. E.)

Amauronematus varianus MacG.—Alaska: West of Konganevik, Camden Bay, June 27, 1914. (C. A. E.)

Enura sp.—Alaska: Anaktuvuk Pass, August 25, 1948, from gall of *Salix*. (N. A. W.); *E. abortiva* and *arctica* MacG. were described from the Canadian Arctic coast.

Rhogogastera reliqua MacG.—Alaska: Nome, August 21-25, 1916. (C. A. E.)

Urocerus flavicornis Fab.—Alaska: Nome. (C. A. E.)

Nematus sp.—Alaska: Collinson Point, November 29, 1913, pupa only. (C. A. E.)

BOMBIDAE

(Bumblebees)

Bombus arcticus (Kirby).—Alaska: Collinson Point, July 10 and Barter Island, June 25, 1914. (C. A. E.) Other localities: Canada: Bernard Harbor, Cape Ross, Melville Island, Northwest Terr.; Herschel Island, Yukon Terr. (C. A. E.)

Bombus frigidus Smith.—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Bombus kirbyellus (Curtis).—Alaska: Nome, August 24-25, 1916; Collinson Point, July 10, 1914. (C. A. E.) Other localities: Canada: Young Point, Fullerton, Northwest Terr. (C. A. E.)

Bombus moderatus Cr.—Alaska: Nome, August 24-25, 1916. (C. A. E.) Anaktuvuk Pass, August 27, 1948. (N. A. W.)

Bombus pleuralis (Nyl.).—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Bombus polaris (Curtis).—Alaska: Nome, August 24-25, 1916; west of Collinson Point, June 11, 1914. (C. A. E.) Other localities: Canada: Kamarkok, west of Herschel Island, Yukon Terr. and Bernard Harbor, Northwest Terr., July, 1915-16. (C. A. E.)

Bombus sylvicola Kirby.—Alaska: Nome, August 24-25, 1916; Teller, July 26, 29, 1913; Barter Island, July 4, 1914; west of Collinson Point, June

11, 1914. (C. A. E.) Other localities: Canada: Herschel Island, Yukon Terr., end of July, 1916; Bernard Harbor, July 3, August 14, 1915; Port Epworth, Coronation Gulf, July 15, 1915, Northwest Terr. (C. A. E.) Unidentified species.—Alaska: Anaktuvuk Pass, July 6-8, 1949; Umiat, July, 1949 (N. A. W.); Sadlerochit River, November 12, 1913 (dead pupae in nest). C. A. E.)

DIAPRIIDAE

(Parasitic Wasps)

Trichopria sp.—Alaska: Anaktuvuk Pass, July 8, 1949, trapped by insectivorous plant, *Pinguicula vulgaris*. (N. A. W.)

Xenotoma sp.—Alaska: Anaktuvuk Pass, August 26, 1948. (N. A. W.)

FORMICIDAE

(Ants)

Myrmica rubra L.?—Under the name of *Formica rubra* this ant was recorded from Parry's and Ross' voyages (see Johansen, 1921, p. 39).

Myrmica rubra is a common European species and the ants may well have been acquired by the ship or its cargo in a European port. It should not be considered a part of the American Arctic fauna on the basis of this record.

Leptothorax acervorum canadensis Prov.—Alaska: Umiat, June, 1948 (P. Scholander). Other locality: Canada: Reindeer Sta., Mackenzie Delta. (M. H.)

Camponotus herculeanus L.—Alaska: Anaktuvuk Pass, July 10, 1949, dealate female. (N. A. W.) Other localities: Canada: Reindeer Sta., Mackenzie Delta, July, 1948, workers and females (M. H.); Great Fish R., from Back's Overland Exped. (Children) (see Johanson, *loc. cit.*, p. 35).

The Anaktuvuk record of this characteristic wood ant is of particular interest in that the species has undoubtedly come through the pass from the spruce woods of the John River, a tributary of the Yukon. The Anaktuvuk site, on the Colville drainage, has large enough shrubs (of *Salix alexensis*) to permit the ants to become established at least during warm periods.

Formica fusca L.—Not taken in Arctic Alaska but recorded from Reindeer Sta., Mackenzie Delta (M. H.) and may turn up on the Alaskan side.

MYRMARIDAE

(Parasitic Wasps)

Myrmar sp.—Alaska: Umiat, July 4, 1949 in *Alnus* thicket, and Pt. Barrow, July 14, 1949, from lemming runway. (N. A. W.)

ICHNEUMONIDAE

(Parasitic Wasps)

Aptesis nivarius Brues.—Alaska: Collinson Point, June 20, 1914. (C. A. E.)

Aptesis sp.—Alaska: Anaktuvuk Pass, July 7, 1949, drowning in Tolugak Lake. (N. A. W.)

Atractodes sp.—Alaska: Anaktuvuk Pass, August 26, 1949. (N. A. W.)

Gelis sp.—Alaska: Anaktuvuk Pass, July 5, 3200 feet, under rock, and July 7, 3600 feet, also under rock, 1949. (N. A. W.) These ant-like and wingless insects occurred under rocks on the steep slopes in company with carabid beetles, spiders and in one case an aphid.

Stenomacrus brevipennis (Ash.).—Alaska: Pt. Barrow, August 20-21, 1948, among grass and herbs. (N. A. W.)

VESPIDAE

(Social Wasps)

Vespa norwegica albida Sladen.—Alaska: Nome, August 24-25, 1916; Teller, July 26, 1913 (as *Vespa marginata* Kirby) (C. A. E.); Anaktuvuk Pass, August 30, 1948, wasp nest with dead workers and females, several cells with honey and several with dead pupae; lower Chandler River, latitude 69° 10' N., longitude 151° 35' W., July 21, 1949, female flying over sunny river bank under *Populus balsamifera* L.; Umiat, July, 1949. (N. A. W.)

Order LEPIDOPTERA

(Butterflies and Moths)

Butterflies and moths may seem incongruous in the conventional view of the snowy tundra, yet they are common and widespread elements of the Alaskan Arctic. The familiar yellowish *Colias* of temperate regions is here, as are several reddish and brown spotted *Brenthis*. None of the butterflies and moths, however, are large and showy. The caterpillars are likely to be densely hairy and several seasons appear necessary for the life cycle. Eleven families of Lepidoptera are known from this region with Nymphalidae and Pieridae best represented.

EUCOSMIDAE

Eucosma sp.—Alaska: Nome, August 24, 1916; west of Kongarievik, Camden Bay, end of June and July, 1914; Barter Island, June 27, July 11, 1914. Other locality: Canada: Bernard Harbor, Northwest Terr., July, 1915. (C. A. E.)

GEOMETRIDAE

Genus undetermined, 1.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 16, 1949, flying over tundra. (N. A. W.)

Genus undetermined, 2.—Alaska: Anaktuvuk Pass, July 23, 1949, flying over meadow beside lake, 9:30 A. M. (N. A. W.)

LYMANTRIIDAE

Byrdia sp.—Alaska: Anaktuvuk Pass, August 27, 1948, large, hairy caterpillar crawling sluggishly on tundra. (N. A. W.)

NOCTUIDAE

Barrovia fasciata Skin.—Alaska: Barter Island, July 11, 1914. (C. A. E.) Other locality: Canada: Herschel Island, Yukon Terr., July 29, 1916. (C. A. E.)

Lygris destinata Moesch.—Alaska: Nome, August 24-25, 1916. (C. A. E.) Other localities: Canada: Cape Pullen, Victoria Island, August 18, and Bernard Harbor, August 25, Northwest Terr. (C. A. E.)

NYMPHALIDAE

Brenthis alaskensis Holland.—Alaska: Barter Island, July 4, 11; Collinson Point, July 10; west of Kongarievik, Camden Bay, July, all 1914 (C. A. E.); Anaktuvuk Pass, July 22-23, 1949. (N. A. W.)

At Barter Island the butterflies were reported flying on tundra in sunshine at a temperature of 50° F. and at Anaktuvuk Pass they were flying over a meadow at the lake shore at a somewhat higher temperature. Also at Anaktuvuk the butterflies were taken at 3800 feet, well up on the rugged mountains, and should easily be able to fly through this pass to or from the Yukon drainage to the south.

Brenthis arctica Zett.—Alaska: Anaktuvuk Pass, July 22, 1949, flying over meadow at 9:30 a.m. at the site of *alaskensis* above. (N. A. W.) A common and pretty species here.

Brenthis polaris Bdv.—Alaska: Barter Island, July 2-17, 1914. (C. A. E.) Other localities: Canada: Bernard Harbor, July 10-20, 1915 and July, 1916; southwest of Cape Krusenstern, July 3-4, 1916; Lake Angmaloktak, Wollaston Land, Victoria Island, July 29, 1915; Wollaston Land, summer 1915;

Port Epworth, Coronation Gulf, July 23, 30, 1915, all northwest Terr. (C. A. E.)

Brenthis chariclea Schneid.—Alaska: Collinson Point, July 10, 1914; Anaktuvuk Pass, July 3, 22, 23, 1949; Umiat, July 24, 1949. (N. A. W.) Other localities: Canada: Bernard Harbor, July 14, 1916, August 4, 6, 1915; Wollaston Land, Victoria Island, summer 1915; Port Epworth, Coronation Gulf, July 15, 1915, Armstrong Point, Victoria Island, July 1-10, 1916. (C. A. E.) This species also occurs more southerly in Canada and an Alaskan record bearing the label "lat. 59° 10' N. to 69° 40' N. and long. 141° (C. A. E.) may fall within Arctic Alaska.

Brenthis freija Thumb.—Alaska: Anaktuvuk Pass, July 6, 1949. (N. A. W.)

Brenthis fugga improba Butl.—Alaska: West of Konganevik, Camden Bay, July; Barter Island, July 1-5, 11, all 1914. (C. A. E.) Other localities: Canada: Bernard Harbor, July, 1916; Port Epworth, Coronation Gulf, July 15, 23, 1915, all Northwest Terr. (C. A. E.)

Polygonia zephyrus Edw.—Alaska: Specimens bearing the label "lat. 59° 30' to 69° 40' N., long. 141° " may have come from the Arctic. (C. A. E.)

OLETHREUTIDAE

Olethreutes sp.—Alaska: Anaktuvuk Pass, July 23, 1949, flying over meadow near lake shore, 9:30 a. m. (N. A. W.)

PHALAENIDAE

Genus undetermined, probably *Agrotinae*.—Alaska: Umiat, 750 feet, July 3, 1949, immatures. (N. A. W.)

Genus undetermined.—Alaska: Anaktuvuk Pass, August 22, 1948, July 9, 1949, larvae. (N. A. W.)

PIERIDAE

Colias, probably *palaeno*.—Alaska: Anaktuvuk Pass, July 22, 1949, flying at 3200 feet in mountain. (N. A. W.)

Colias pelidne Boisd and Le C.—Alaska: Anaktuvuk Pass, July 24, 1949. (N. A. W.)

Colias nastes alaskae B.—H.—Alaska: Umiat Mt., 950 feet, July 11, 1949. (N. A. W.)

Erebia rossii Curtis.—Alaska: Anaktuvuk Pass, July 23, 1949, flying over meadow at lake shore, 9:30 a. m. (N. A. W.) A large, dark butterfly not uncommon here.

Erebia disa streckeri Hall.—Alaska: Umiat Mt., 950 feet, July 11, 1949. (N. A. W.)

Eurymus hecla glacialis McLoch.—Alaska: Collinson Point, July 10; Barter Island, July 4-21, 1914. (C. A. E.) Other localities: Canada: Herschel Island, Yukon Terr. end of July, 1916; Bernard Harbor, Northwest Terr., July 14, August 4-25, 1915. (C. A. E.)

Eurymus palaeno chippewa Edw.—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Eurymus nastes Bdv.—Alaska: Collinson Point, July 10, 17; Barter Island, July 17, all 1914. (C. A. E.) Other localities: Cockburn Point, Dolphin and Union Strait, September 2, 1915; Bernard Harbor, July 30, August 1-25, 1915, July 14, 1916; Armstrong Point, Victoria Island, early July, 1916, all Northwest Terr. (C. A. E.)

PYRALIDAE

Diasemia alaskanis Gibson.—Alaska: Collinson Point, July 10, and Konganevik, Camden Bay, early July, 1914. (C. A. E.)

Pyla arctiella Gibson.—Alaska: Collinson Point, July 17, 1914. (C. A. E.)

SATYRIDAE

Oeneis taygete hanburyi Wats.—Alaska; Anaktuvuk Pass, July 6, 22, 1949, 3200 feet on mountain. (N. A. W.)

TORTRICIDAE

Sparganothe ?.—Anaktuvuk Pass, July 22-23, 1949, flying over meadow at lake shore, 9:30 a. m., and at 3200 feet on mountain. (N. A. W.)

DIPTERA

(Flies)

Two-winged flies are easily the most numerous of the obvious insects in the Arctic. Mosquitoes in Arctic and sub-Arctic regions are notoriously bad and occur in incredible swarms. Only in a marsh in temperate zones do the numbers approximate those arising from the innumerable tundra pools. Nothing like these numbers have been encountered by the author in the tropics although the upper Orinoco Delta, Venezuela, is sufficiently bad so that the Indians regularly move out at the time of their largest numbers, which comes during the dry season. Fortunately the Arctic Alaskan mosquitoes are not known to carry malaria. They are nevertheless important pests of caribou and Dall's sheep, as well as of Eskimos. Possibly the females usually acquire their blood meals from shore and aquatic birds.

While mosquitoes are the notorious insects, there is a great variety of midges which may well have a greater general biological importance. The larvae are scavengers and important agents in the first step in converting dead or living vegetation into more

complex foods. They serve as food for fishes and other animals, aquatic or terrestrial, as do the adults. Many of the midges belong to the family Tendipedidae, also known as Chironomidae.

In addition to mosquitoes and midges there are numerous blow-flies and a botfly of some importance to the Eskimos through its infestation ruining the skins of caribou. Many other types of flies are represented as may be seen below. The common house fly has yet to reach Pt. Barrow although conditions now may be suitable and it may be merely a question of time.

Order DIPTERA

Suborder NEMATOCERA

TIPULIDAE

Dicranomyia alascaensis Alexander.—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Poecilostola ?.—Alaska: Demarcation Point, May, 1914. (C. A. E.) One large larva taken in melted pond on tundra.

Stygeropsis parrii (Kirby).—Alaska: West of Kongenevik, Camden Bay, July 4, Collinson Point, June 22-23, 1914, also possibly Demarcation Point, May. (C. A. E.) Other locality: Bernard Harbor, Northwest Terr., July 1-14, 1916, July-August, 1915. (C. E. A.)

Tipula bergrothiana Alexander.—Alaska: Anaktuvuk Pass, July 10, 1949, flying over tundra. (N. A. W.)

Tipula sp.—Alaska: Anaktuvuk, July 8, 1949, larvae from margin of stream bed; July 10, 1949, larva on summit of 900 foot mountain (elev. 3100 feet above sea level) in moist black humus at roots of *Salix*, *Potentilla*, grasses, etc.; August 25-30, 1948, larvae. (N. A. W.)

Tipulidae sp.—Alaska: Umiat Mt., 900 feet, July 11, 1949. (N. A. W.)

Tipulini.—Alaska: Nome, August, 1916, larvae; Demarcation Point, May, 1914, larvae in melted ponds on tundra. (C. A. E.)

Tricyphona brevifurcata Alexander.—Alaska: west of Konganevik, Camden Bay, July 4, 1914, male. (C. A. E.)

TENDIPEDIDAE

(Chironomidae)

DIAMESINAE

Diamesa sp.—Alaska: Anaktuvuk Pass, August 29-30, 1948, walking on snow. (N. A. W.)

HYDROBAENINAE

Unident. sp.—Alaska: Pt. Barrow, July 13, 1949, from yellow flower; Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, from sweepings over tundra; Anaktuvuk Pass, July 10, 1949, from vegetation on summit of 900-foot mountain (elev. 3100 feet above sea) and at same place, from blue flower of shooting star, *Dodecatron frigidus*. (N. A. W.)

ORTHOCLADIINAE

Cricotopus sp.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, from sweeping over tundra. (N. A. W.)

Orthocladius, sp. 1.—Alaska: Collinson Point, June 22-23, 1914. (C. A. E.)

Orthocladius, sp. 2.—Alaska: Demarcation Point, May 16, 1914, in mud of freshwater ponds. (C. A. E.)

Spaniotoma spp.—Possibly including the two species listed as *Orthocladius* above and consisting of a number of species. Probably the most numerous winged insect of the tundra about Pt. Barrow and perhaps of the Alaskan tundra generally. Alaska: Pt. Barrow, August 20-22, September 2, 1948, July 14, 1949; Anaktuvuk Pass, August 26-20, 1948; Fish Creek, latitude 70° 20' N., longitude 151° 30' W., July 16, 1949, from sweeping over exposed tundra in high, cold wind. (N. A. W.)

Numerous other collections made at other times and places doubtless include this genus. A complex group for the dipterologist and one in considerable need of study.

Spaniotoma is deeply involved in the tundra life. The larvae are reared in a variety of media including regurgitated pellets of the snowy owl, the humus or sand about the clumps of beach plants and others back in the tundra. They also live in inland black-bottomed pools, where they actively wriggle about, and occur in great numbers in the nests of lemmings, dominant vertebrates of the tundra. At the very northern tip of Alaska, the Pt. Barrow sandspit, larvae were taken at the bases of *Salix*, *Saxifraga groenlandica*, *S. hirculus* and other plants in a habitat characterized by my companion, Dr. Scholander, as typical Arctic tundra, more so than the general Arctic coast region of Alaska. Larvae are well adapted to low temperatures and may "loop" over the wet tundra at near freezing temperatures with patches of snow in the immediate vicinity. Larvae from a lemming nest taken into the laboratory pupated and emerged as imagoes on the eleventh and successive days. Adults alight and walk freely about on snow at slightly below freezing temperatures. They also alight freely on pools

where they do not perceptibly depress the surface film. During the frequent winds of the coastal area the adults stay close to the ground among the low plants.

PELOPIINAE

Unident sp.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, from sweeping over tundra; Fish Creek, latitude 70° 20' N., longitude 151° 30' W., July 16, 1949, from sweepings over low tundra in high wind. (N. A. W.)

TENDIPEDINAE

Tendipes sp.—Alaska: Fish Creek, latitude 70° 20' N., longitude 151° 30' W., July 16, 1949, from sweepings over low tundra in high wind. (N. A. W.)

Chironomus, sp. 1.—Alaska: Barter Island, July 2, 1914. (C. A. E.)

Chironomus, sp. 2.—Alaska: Collinson Point, June 22, 1914, from pool. (C. A. E.)

This and the preceding species may possibly belong to what is now called *Tendipes*.

Unidentified spp.—Alaska: Pt. Barrow, July 14, 1949, from sweepings over yellow flowers and sedges; Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 16, 1949, from surface of tundra pool; Fish Creek, latitude 70° 20' N., longitude 151° 30' W., July 16, 1949, from sweepings over low tundra in high wind; Anaktuvuk Pass, July 8, 1949, larvae from margin of stream bed. (N. A. W.)

HELEIDAE

(Ceratopogonidae)

Dasyhelea sp.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, from sweepings over tundra and from surface of pool. (N. A. W.)

Helea sp.—Alaska: Anaktuvuk Pass, July 5, 1949, 2500 feet, in humus on rocky slope. (N. A. W.)

MELUSINIDAE

Melusina sp.—Alaska: Anaktuvuk Pass, July 6, 1949, larvae in humus under *Salix alexensis* near creek; Pt. Barrow, August 21, 1948, under wood. (N. A. W.)

SIMULIIDAE

Simulium arcticum Mall.—Alaska: Anaktuvuk Pass, August 27, 1948, becoming nuisance at lake shore at noon. (N. A. W.)

CULICIDAE

Aedes communis (De Geer).—Alaska: Umiat, May-August, 1947. (Jackowski and Schultz)

Aedes nearcticus Dyar.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 16, 1949, from surface of tundra pool (N. A. W.); Umiat, May-August, 1947 (Jackowski and Schultz)

Aedes nigripes (Zett.).—Alaska: Fish Creek, latitude 70° 20' N., longitude 151° 30' W., July 16, 1949, from sweepings over low tundra in cold, high wind (N. A. W.): Umiat, May-August, 1947. (Jackowski and Schultz)

Aedes punctor (Kirby).—Alaska: Umiat, May-August, 1947. (Jackowski and Schultz)

Aedes spp.—Alaska: localities of the *Aedes* species above; Umiat, July 2, 1949, 8 p. m. (N. A. W.)

Swarms of unidentified mosquitoes, doubtless of this genus, were encountered in numerous localities during July, 1949. Low temperatures and high winds kept them down at Umiat until July 4. The day of my arrival at Anaktuvuk Pass on July 5 was the first day the Eskimos reported that they were at all pestered by mosquitoes, because of the coolness of the season. Their numbers rapidly increased, with great swarms in sheltered places exceeding in numbers those in the tropics. At temperatures of 55°–60° F. in the evening, when the sun did not set during the night, they remained active and pestiferous but at temperatures below 50° they became sluggish, and at temperatures from 40°–45° F. they did not fly about. Apparently their chief breeding places were the tiny pools on the tundra. They ascended the heights of the Brooks Range and were extremely numerous on July 22 at over 4500 feet wherever they found shelter in the lee of the rugged slopes. Caribou, Dall's sheep and other mammals seek refuge on the most exposed slopes to escape the hordes. It is probable that the mosquitoes ascend to at least 5000–6000 feet here. Spiders form webs between the jagged rocks and catch large numbers on the mountain slopes.

FUNGIVORIDAE

(Sciophilidae, Sciaridae)

Boletina sp.—Alaska: Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 16, 1949, from surface of tundra pool; Umiat, August 24, 1948, in *Alnus* thicket. (N. A. W.)

Bradysia sp.—Alaska: Umiat, July 3, 1949, inside quonset sleeping quarters 8 a.m.; Anaktuvuk Pass, July 8, 1949, trapped by insectivorous plant, *Pinguicula vulgaris*, July 5, 1949, 2,500 feet, on rock. (N. A. W.)

Lycoria sp.—Alaska: Pt. Barrow, August 21-23, 1948, larvae under wood on tundra and adults at inside of laboratory window 3:15 p.m.; Umiat, August 24, 1948, adults in *Alnus* thicket; Anaktuvuk Pass, August 25-26, 1948, adults, larvae July 6, 1949 in humus under *Salix alexensis* beside creek (N. A. W.) A common midge. Also Teller and Nome (as *Sciara*). (C. A. E.)

Phronia sp.—Alaska: Anaktuvuk Pass, August 25, 1948, flying in lee of river bank in low 40°'s F. (N. A. W.)

Rhymosia sp.—Alaska: Anaktuvuk, August 28, 1948, midge floating on pool. (N. A. W.)

ITONIDIDAE

Unidentified sp.?—Alaska: Anaktuvuk Pass, July 8, 1949, larvae from margin of stream bed. (N. A. W.)

LARVAEORIDAE

(Tachinidae)

Genus and species?, near *Alaskophyto*.—Alaska: Anaktuvuk Pass, August 27, 1948.

Euphorocera gelida Coquillett.—Alaska: Camden Bay, Demarcation Point, June-July, 1914. (C. A. E.)

BIBIONIDAE

Bibio sp.—Alaska: Anaktuvuk Pass, August 28, 1948. (N. A. W.)

SCATOPSIDAE

Scatopse sp.—Alaska: Anaktuvuk Pass, July 8, 1949, from humus of stream bed and from entrance to burrow of *Citellus parryi*. (N. A. W.)

Suborder ORTHORRHAPHA

TABANIDAE

Tabanus (Hybomitra) frontalis septentrionalis Loew.—Alaska: Head of Nanushuk River, latitude 68° 24' N., longitude 150° 30' W., July 22; Anaktuvuk Pass July 23, and Umiat, August 2, all in 1949. (N. A. W.) Evidently having a very short season as adults in these latitudes of scarcely more than a month.

Tabanus (Hybomitra) boreus Stone.—Alaska: 69° 10' N., 141° W. (Stone.)

Tabanus (Hybomitra) sexfasciatus Hine.—Alaska: Umiat, July 5, 8, 1950. (N. A. W.)

EMPIDIDAE

Bicellaria pilipes Loew.—Alaska: Anaktuvuk Pass, August 26, 1948. (N. A. W.)

Empis sp.—Alaska: Umiat Mountain, 950 feet, July 11, 1949, attacked by spider; Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15-16, 1949, from sweepings over tundra. (N. A. W.)

Rhamphomyia erinacioides Malloch.—Alaska: West of Kongenevik, Camden Bay, July 4; Barter Island, July 11, 1914. (C. A. E.)

Rhamphomyia sp.—Alaska: Anaktuvuk Pass, 2500 feet, July 5, 1949, on rocky slope. (N. A. W.)

DOLICHOPODIDAE

Dolichopus sp.—Alaska: Nome, August 21, 1916. (C. A. E.)

Hydrophorus pilitarsis Malloch.—Alaska: Teller, July 29, August 6, 1913. (C. A. E.)

Hydrophorus signiferus Coquillett.—Alaska: Teller, July 29, August 6, 1913. (C. A. E.)

Hydrophorus innotatus Loew.—Alaska: Collinson Point, June 20, 1914. Other locality: Canada: Bernard Harbor, Northwest Terr., June, 1915. (C. A. E.)

Suborder CYCLORRAPHA**PHORIDAE**

Apiochaeta alaskensis Malloch.—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Apiochaeta platychira Malloch.—Alaska: Nome, August 21-25, 1916. (C. A. E.)

Apiochaeta sp.—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Megaselia dubitata Malloch.—Alaska: Anaktuvuk Pass, August 26, 1948. (N. A. W.)

SYRPHIDAE

Helophilus dychei Williston.—Alaska: Nome, August 24-25, 1916. Other locality: Canada: Bernard Harbor, Northwest Terr., July 6, 1916; on *Dryas* flower. (C. A. E.)

Metasyrphus sp.—Alaska: Anaktuvuk Pass, July 6, 1949, larvae in humus under *Salix alexanensis* beside creek. (N. A. W.)

Scaeva pyrastris L.—Alaska: Barter Island, June 10, 1914. (C. A. E.)

Syrphus sp.—Alaska: Anaktuvuk Pass, July 9, 1949, sweepings along edge of creek in strong wind. (N. A. W.)

SARCOPHAGIDAE

Sarcophaga sp.—Alaska: Pt. Barrow, July 13, 1949, larvae and pupae from lemming carcass (*Dicrostonyx rubricatus*) found on tundra. (N. A. W.)

SCATOPHAGIDAE

(Scopeumatidae)

Dasypleuron tibialis Malloch.—Alaska: Collinson Point, June 20, 1914. (C. A. E.)

Scatophaga furcata (Saz).—Alaska: Nome, August 21-25, 1916; Barter Island, June 8, July 2, 1914; Collinson Point, June 15, 1914. (C. A. E.) Other locality: Canada: Wollaston Peninsula, Victoria Island, August 18, 1915. (C. A. E.)

Scatophaga stilla (Fabr.).—Alaska: Nome, August 21, 1916. (C. A. E.)

Scopeuma (formerly *Scatophaga*) *vulpinum* (Coquillett).—Alaska: Pt. Barrow, July 13, 1949. (N. A. W.)

A seething mass of larvae emerged from what was apparently a shotgun wound in the side of an Eskimo dog carcass which had perhaps lain on the tundra about a week. Large and small larvae were scattered in the fur; the air temperature was in the low 40's F. The rich-brown, hairy adults were slow-moving in the cold and many had defective wings. Several attempted copulation, but mostly they fell from the fur to the ground and crawled sluggishly back to the carcass. An Eskimo with me knew about the flies as infecting meat. On the same day a water-soaked lemming nest was examined which contained a decomposing adult (*Dicrostonyx rubricatus*). Several hundred larvae emerged from the carcass when it was brought into the laboratory, as did several adults.

Scopeuma lanatum (Lund.).—Alaska: Anaktuvuk Pass, July 5, 1949, 10 p. m. in bright sun. (N. A. W.)

Scopeuma nubiferum (Coq.).—Alaska: Pt. Barrow, August 22, 1949, dead on pool. (N. A. W.)

Undetermined sp.—Alaska: Anaktuvuk Pass, August 30, 1949, larvae. (N. A. W.)

CALLIPHORIDAE

Boreelus atriceps Zett.—Alaska: Pt. Barrow, August 22, 1948. (N. A. W.) Puparia from carcass of Eskimo dog, on tundra near coast, from which imagoes emerged August 31, in the laboratory, and September 1-2. (N. A. W.)

Calliphora viridescens Rob.-Desv.—Alaska: Nome, June 21, 1916. (C. A. E.)
Cynomyopsis cadaverina (R. D.).—Alaska: Pt. Barrow, August 22, 1948, from Eskimo dog carcass (N. A. W.); Barter Island, June 15, 20, 23, July 2, 1914, west of Konganevik, Camden Bay, June 4, 1914; Nome, August 24-25, 1916. (C. A. E.)

Lucillia illustris (Mg.)?—Alaska: Pt. Barrow, July 13, 1949, from Eskimo dog carcass of *Scopeuma vulpinum* above. (N. A. W.)

Phoenicia sp.—Alaska: Pt. Barrow, August 22, 1948, from Eskimo dog carcass of *Borectus atriceps* above. (N. A. W.)

Phormia terrae-novae Rob.-Desv.—Alaska: Nome, August 24-25, 1916; Teller, July-August, 1913; Collinson Point, June, 1914; Demarcation Point, May 13, 1914. (C. A. E.) Oumalik, latitude 69° 50' N., longitude 156° 00' W., July 15, 1949, puparia under board from which imagoes emerged by July 25. (N. A. W.) Other locality: Canada: Bernard Harbor, Northwest Terr., June-August, 1915, June-July, 1916. (C. A. E.)

Genus and species undetermined.—Alaska: Anaktuvuk, 1948.

MUSCIDAE

Alliopsis obesa Mall.—Alaska: Anaktuvuk, alighting twice momentarily on snow bank, August, 1948. (N. A. W.)

Alliopsis sp.—Alaska: Camden Bay, June, 1914. (C. A. E.)

Hylemyia acrostichalis Malloch.—Alaska: Nome, August 21, 1916. (C. A. E.)

Hylemia variata (Fallen).—Alaska: Nome, August 24-25, 1916. (C. A. E.)

ANTHOMYIDAE

Egle radicum (L.).—Alaska: Nome, August 21, 24-25, 1916; Teller, July 29, 1913. (C. A. E.)

Pegomyia albimargo Pandell.—Alaska: Nome, August 21-24, 1916. (C. A. E.)

Pegomyia flavipes (Fallen).—Alaska: Nome, August 21, 1916. (C. A. E.)

Phorbia brevitarisata Malloch.—Alaska: west of Konganevik, Camden Bay, June, July 4, 1914. (C. A. E.)

Phorbia spp.—Alaska: Collinson Point, June 20, 1914. (C. A. E.)

Phaonia minima Malloch.—Alaska: Nome, August 21-24, 25, 1916. (C. A. E.) Other locality: Canada: Bernard Harbor, Northwest Territory, May 19, 1916; May 20, 22, June 25, July 11, 1915. (C. A. E.)

PIOPHILIDAE

? (*Allopiophila*) sp.—“Possibly a new genus and new species. It seems near *A. aterrima* (Becker) described from Novaya Zemlya”.—Alaska: Pt. Barrow, larvae in turfy tundra August 22, and appearing from beneath carcass of small duck September 2, 1948, at top of sandspit of the point.

Beneath the duck the ground was covered with frost crystals and larvae were here contracted and immobile. Imagoes appeared 24 hours later from the carcass in the laboratory. (N. A. W.)

HELEOMYZIDAE

Neolaria rotundicornis Malloch.—Alaska: Nome, August 24-25, 1916. (C. A. E.)

Neolaria tibialis (Zett.), at least in sense of authors.—Alaska: Anaktuvuk, August, 1948. (N. A. W.)

Neolaria sp.—Alaska: Pt. Barrow, August 22, 1948, adults under Eskimo dog carcass described under *Phaenicia* above; sluggish in the near-freezing temperature, ice and snow on the tundra not thawing. (N. A. W.)

Oecotha aristata Malloch.—Alaska: Anaktuvuk Pass, August, 1948. (N. A. W.)

AGROMYZIDAE

Agromyza immaculata Coq.—Alaska: Anaktuvuk Pass, August 25, 1948, flying in lee of river bank. (N. A. W.)

CHLOROPIDAE

Botanobia (Oscinis) frit (L.).—Alaska: west of Konganevik, Camden Bay, July 4, 1914. (C. A. E.)

EPHYDRIDAE

Scatella brunnipennis Malloch.—Alaska: Demarcation Point, May 16; Collinson Point, June 20, 1914, September 22, 1913. (C. A. E.) Other locality: Canada: Bernard Harbor, Northwest Terr., July, 1915. (C. A. E.)

SPHAEROCERATIDAE

(Borboridae)

Copromyza sp.—Alaska: Pt. Barrow, September 5, 1948 and earlier; appearing in the mess hall sparingly with *Leptocera fontinalis* below, and under Eskimo dog carcass of *Phaenicia et al.* above. (N. A. W.)

Leptocera fontinalis (Fall).—Alaska: Pt. Barrow, September 5, 1948 and earlier; appearing in the mess hall sparingly at the dining tables and found dead in numbers in a 30-gal. can of cornmeal in the storeroom. Not a pest and reported to be present only in 1948. Not seen June-August, 1949. (N. A. W.)

Order SIPHONAPTERA

(Fleas)

Fleas, these small, wingless and laterally compressed insects, are mammalian ectoparasites which are not common in the Arctic, probably because the cold climate makes life hazardous for the free-living larvae. Eskimo dogs are not known here to have ticks or fleas.

The locally common ground squirrel, *Citellus parryi barrowensis* (Merriam), carries fleas sparingly but identifications have not yet been reported for the few collected. A live *Citellus* at Anaktuvuk Pass, August 27, 1948, was carefully examined but no fleas were seen. On another at the same time, however, two fleas were seen of which one escaped. On captive *Citellus* at Pt. Barrow, September 1, 1948, which were taken some ninety miles south, several fleas were collected.

From a shrew (*Sorex o. obscurus* Merriam) which Dr. Robert Rausch took at Tolugak Lake, Anaktuvuk Pass, July 22, 1949, a single flea was taken (*Corrodopsylla curvata* (Rothschild)).

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EXPLANATION OF PLATES

PLATE IV

Finely broken-up drift wood material from the open beach of the northernmost tip of Alaska, the Point Barrow sandspit. Many Collembola, mites and dipterous larvae lived in this habitat, which was relatively stable because of feeble tidal change, constant humidity and relatively even, though low, temperatures. The occurrence of arthropods at this site demonstrates the ease with which they may be carried along Polar shores and become circumpolar in distribution.

PLATE V

Lemming runways at the northernmost tip of Alaska, the Point Barrow sandspit. The grass grew luxuriantly in the vicinity of old Eskimo dug-outs made with whalebones. Great numbers of yellowish Collembola, many *Spaniotoma* and other dipterous larvae and other arthropods were taken from the runways.

PLATE VI

Lemming winter nest exposed by the melting of the snow cover in June, although with a slight fall of new snow on the windward side; canvas work gloves indicating the size. From this damp nest material several thousand mites, Collembola and *Spaniotoma* larvae were taken and a few spiders and staphylinid beetles. Pt. Barrow.

PLATE VII

North front of the Endicott Mountains at Anaktuvuk Pass from an elevation somewhat above four thousand feet. Collembola and mites live in the lichen-moss growth on the rubble, swarms of mosquitoes and some other flies, stoneflies, beetles, moths and butterflies were also to be found at this elevation.

PLATE VIII

Arrow points to egg case of spider at 3500 feet in Anaktuvuk Pass. The spider (not shown) had spun a small web in a crevice between lichen-covered rocks on a talus slope.

PLATE IX

A female spider, *Aculepeira aculeata* Emerton, in her orb nest at 3500 feet in Anaktuvuk Pass. Fourteen mosquitoes and a moth were trapped in the webs.

PLATE X

Sandbar along the Anaktuvuk River on the north front of the Endicott Mountains at Anaktuvuk Pass. At this comparatively xerophilous site were such beetles as *Thanatophilus trituberculata* (Silphidae) and *Asaphidion*, *Cryobius*, *Bembidion* and *Elaphrus* (Carabidae). Many other species of insects occurred here in the thin growth of *Carex* near the water and among *Salix alexensis* to be seen at the left and farther back from the water. A number of spiders were carrying egg cases at this date (9 July).